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Number 6

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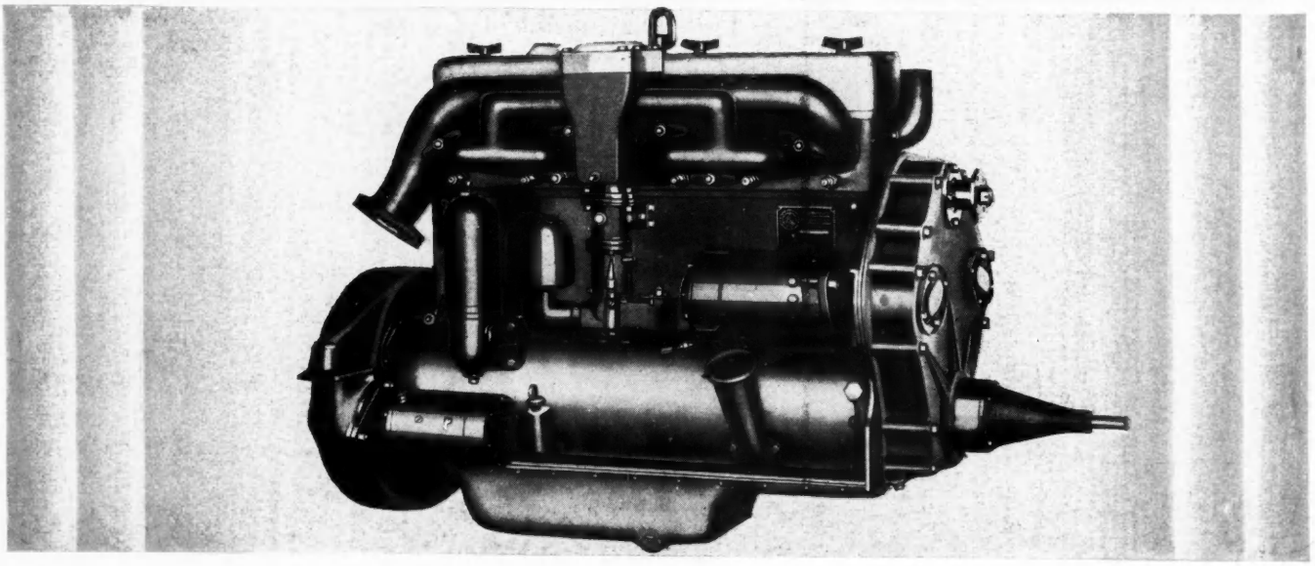

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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Established 1902

Vol. 61 No. 6

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Cable Address.....Autoland, Philadelphia
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OFFICES

New York—U. P. C. Bldg., 239 W. 39th St., Phone Pennsylvania 0080
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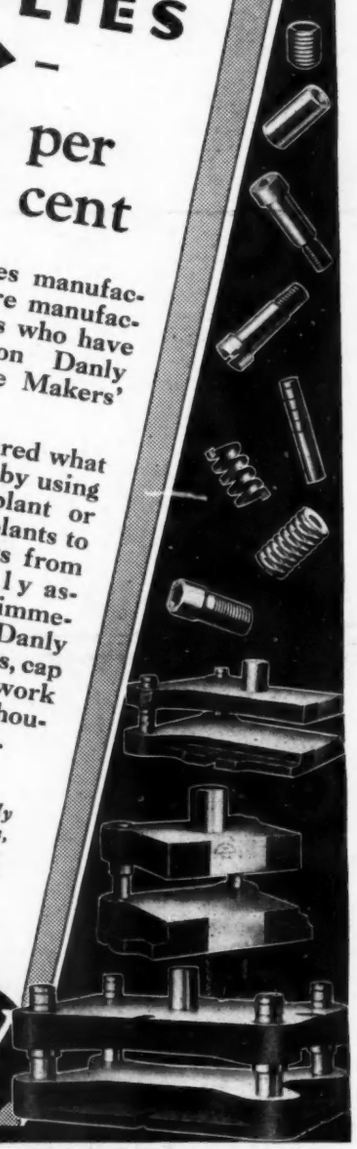

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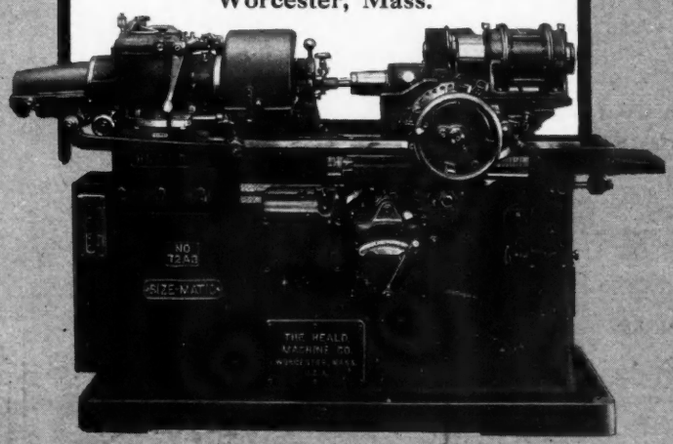


AUTOMATIC

AUTOMATIC

HEALD

AUTOMOTIVE INDUSTRIES

VOLUME 61 *Philadelphia, Saturday, August 10, 1929* NUMBER 6

Price Changes

A SLIGHTLY downward tendency in passenger car prices is being exhibited as new models are announced and as the summer wears toward the fall. Definite price comparisons are not always possible in an accurate way between old and new models, but examination of the lists which have been coming through lately unquestionably show some downward inclinations. In view of this fact, it is now reasonable to expect further declines in an attempt to readjust the competitive situation.

Thus far, however, readjustments have been orderly and apparently parts of planned merchandising campaigns. There is no evidence in most instances of hurried changes to meet moves made by competitors. There still is no reason to look for a wholesale slashing of prices, even though a majority of factories are pretty strenuously engaged in trying to find some way to stimulate volume sales at this particular time.

Back in the June 8 issue of *Automotive Industries* appeared the statement that "Price stability throughout the whole range of automotive products during the next six months seems highly desirable." Nothing has occurred since to alter the basic soundness of that conclusion.

Passenger car price changes, it is our impression, are causing somewhat more concern among factory men than among dealers at the moment. About a week following the announcement of lower prices on a new model by an important maker, recently, for example, we telephoned a big rival dealer to ask if he were feeling much effect from the lower prices on this competitive product. He replied:

"No, I can't say that I have. To be honest with you, as a matter of fact, I don't even know what Blank's new prices are."

That answer may be construed by some as lack of initiative and liveliness on the part of the dealer questioned; by others it will be interpreted as significant of the newer spirit in merchandising among modern, good dealers, the spirit of being so busy selling one's own goods at what one considers a fair price as to be only mildly interested in price readjustments by competitors.

Development of anything in the nature of a price war would be very bad for the automotive industry at this time. The very financial strength of the leaders would make such strife capable of serious losses to all concerned. Dominating executives in the industry understand these facts clearly; consequently there is no sound basis for interpreting any current price changes as anything more than normal readjustments brought about by changing marketing conditions.

—N. G. S.

Chrysler Announces Three Models At Prices *Ranging From*

Four-speed transmission and downdraft the two larger cars. Other are not affected by

By ATHEL F.

WHAT amounts to a complete realignment of models in the Chrysler line is found in the presentation of its 1930 models, the 66, 70 and 77 by the Chrysler Corp. Four-speed gearshifts, downdraft carburetion (in the two larger models), new developments in rubber spring suspension, new body details, greater roominess, and longer wheelbases are included in the number of new features.

It is to be understood, of course, that the present announcement in no way affects the other divisions of the Chrysler Corp., including Dodge Brothers, De Soto, and Plymouth. Nor is the Chrysler Imperial model changed at the present time. Basically, then, the three new models replace the former 65 and 75. The new 66 is somewhat lower in price than the 65, the 70 is slightly higher priced than the 65, and the new 77 is slightly higher in price than the 75.

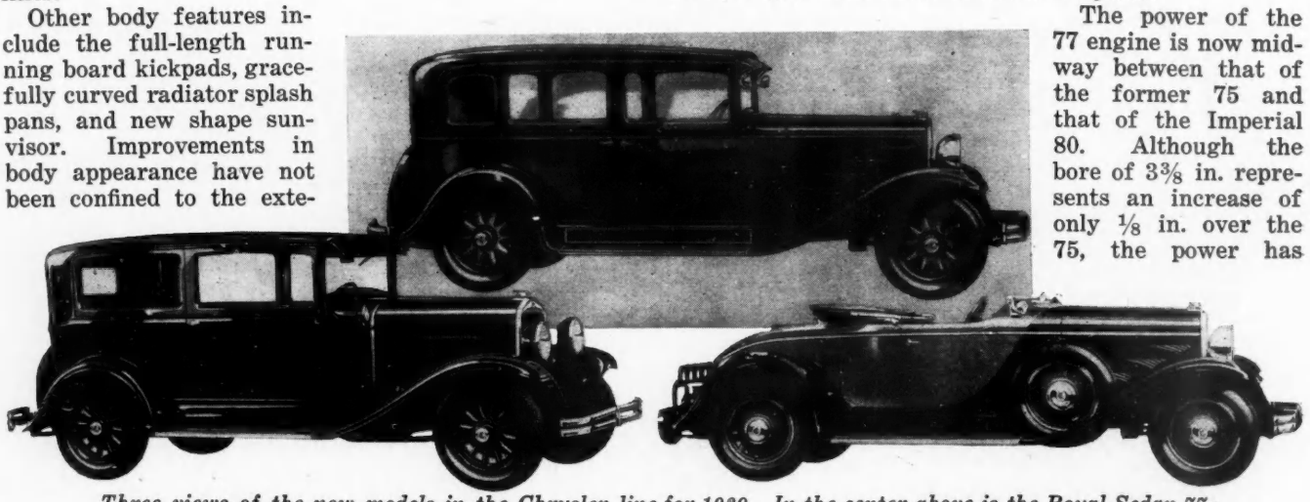
Taking the cars individually, the new 77 has probably the largest number of improvements. Distinctive external appearance is produced by the arrangement of louvers in the hood, the mounting of parking lights at the top of the body front pillars, etc. Especially striking are the open body models in their paneled effects, as may be noted from the accompanying illustrations. The radiator shell is about ⅜ in. wider than formerly. The use of replaceable chrome-plated body moldings on the Town and Crown sedans is another distinct innovation, this molding sliding in place over a steel strip spot-welded to the body panels and grooved. As far as maintaining the "new" appearance of a car is concerned, this is a distinct improvement, since on most cars lacquered body moldings lose their color first. Chrome-plated window moldings on all closed cars, instead of colored reveals, are another improvement along these lines.

Other body features include the full-length running board kickpads, gracefully curved radiator splash pans, and new shape sun-visor. Improvements in body appearance have not been confined to the exterior, however. The treatment of interiors on the 77, especially in the hardware, is quite striking. A futuristic combination parallelogram and trapezoidal effect has been worked out and is applied not only to the instrument panel but to every fitting, including door handles, window cranks, rear corner lights, garnish moldings, robe rails, ash trays and vanity cases and even foot rest hinge brackets.

In addition to adjustable seats, and slightly slanting windshields, there are folding rear center arm-rests in the Crown and Town sedans on the rear seats which are now 3 in. wider. The front seat adjustment permits of a 4 in. total movement, by means of a fine pitch screw. Headroom has been increased 2½ in.; interior length, 1¼ in. Then there is a three-spoke steering wheel, as against the usual four-spoke type. Double windshield wipers, tandem-operated, are an important safety feature.

The entire front end of the body is now built of steel, the cowl and dash, front corner pillars, and windshield cross bars being spot-welded together in a single unit. Rear side sills, center pillars and cross sills are now also of steel. French roofs with chicken wire center and metal side panels have also been adopted. Door checks are now of the spring controlled type, the check being located slightly below the center of the door, with the spring control hidden in the door jamb.

The power of the 77 engine is now midway between that of the former 75 and that of the Imperial 80. Although the bore of 3⅜ in. represents an increase of only ⅛ in. over the 75, the power has



Three views of the new models in the Chrysler line for 1930. In the center above is the Royal Sedan 77, to the left is the 66 Brougham and to the right is a side view of the 77 roadster. The demountable wheels shown in the last-named view are listed at extra cost

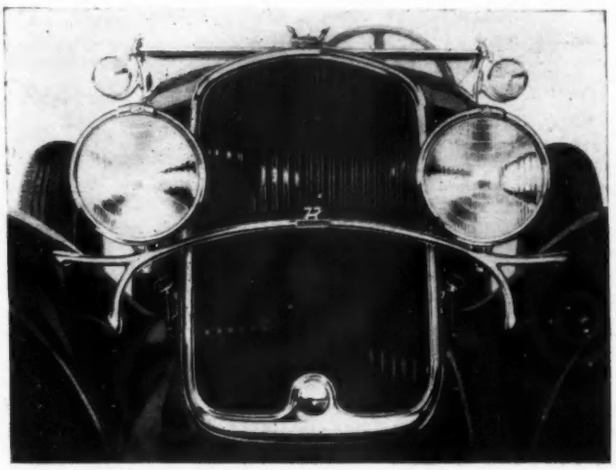
In 1930 Line, Replacing 65 and 75, *$985 to* $1,795 F. O. B.

carburetion are new features on divisions of the corporation the present offering.

DENHAM

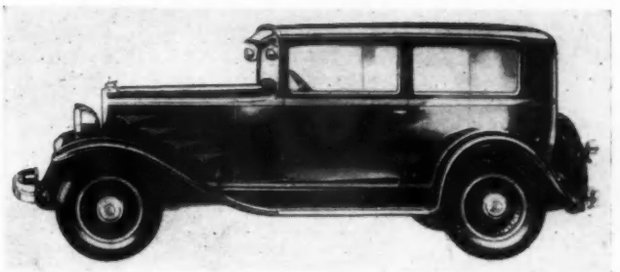
been increased from 75 at 3200 r.p.m. to 93 hp. Much of the power increase is attributable to the new downdraft carburetion and reduced back-pressure in the exhaust. In the downdraft carburetor the air current does not have to raise the gasoline globules against the force of gravity, hence the air tube can be made larger in diameter and the volumetric efficiency thereby increased. In the 77, the depression in the inlet manifold, under full throttle at 3000 r.p.m., is only 1 in. of mercury column, as compared with the more usual 2/3 in. The downdraft type of carburetor also improves the distribution, and for that reason makes possible the use of a cooler manifold. In the Chrysler 77 and 70 the manifold is provided with a shield to reduce the temperature. The fumer is now located at the lowest point in the manifold near the overload drain.

With a downdraft carburetor there is quite a chance of overloading the manifold in case of overchoking, and to prevent this a drain is provided at the bottom of the manifold tee. This acts normally as an airbleed, but since the aperture is no larger than that used with a vacuum booster, its inclusion in the system offers no difficulties. Incidentally, the manifold is of the two-piece type, as against a one-piece unit on the former 75. Placing the carburetor above the engine, rather than at the side, also makes for greater valve compartment accessibility. The carburetor is of Stromberg manufacture. It has a venturi size of 1⅜ in., and incorporates a vacuum-operated accelerating plunger pump and economizer. The accelerating pump

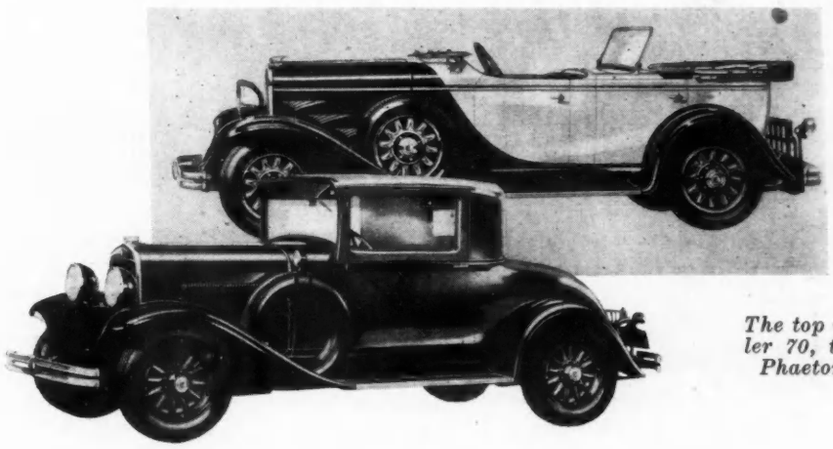


Front view of Chrysler 77 Roadster, showing the new method of mounting cowl lights on the windshield pillars

is operated by a piston in a chamber connected to an airbleed in the carburetor throat. The piston is provided with a spring to return it to its normal position at the top of the chamber. The piston rod attaches to a walking beam, which in turn operates the piston in the normal Stromberg accelerating pump. Also connected to the walking beam is the plunger for the economizer, which operates when there is 8 in. of



vacuum or more in the manifold. A "Carbosolve" decarbonizing fluid reservoir is mounted on the dash. Fuel feed is by a mechanical pump driven from the camshaft in the usual manner. A heat-control valve is provided in the exhaust manifold. In the exhaust system the muffler is of 1 in. larger diameter than on the 75, while the exhaust pipe diameter

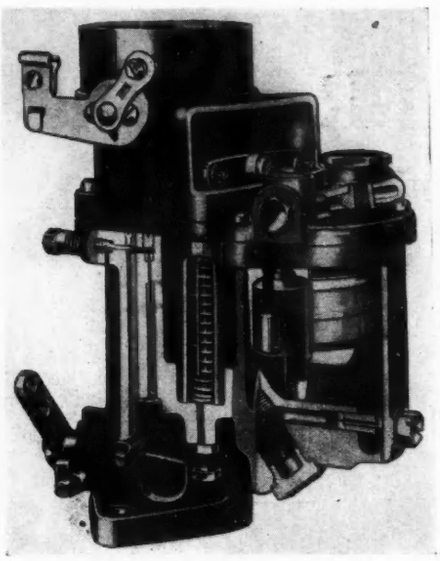


The top view in the above group is the new Chrysler 70, two-door sedan. In the center is the 77 Phaeton and to the left is the 66 business coupe

also has been increased from 2 in. to 2¼ in. The muffler has been improved in design to materially reduce the back-pressure, thereby increasing engine power, and it is lagged with asbestos for greater quietness.

Other engine changes in the 77 (as compared with the 75) include the adoption of full-floating piston pins, metric spark plugs, and a lower ratio in the starter gearing, there now being 11 teeth on the pinion and 114 on the steel gear, which latter is shrunk on the flywheel. Starter engagement is by mechanical shift, as on the 75.

The ignition system for the three new models includes three-lobed cam and double-breaker type of distributor, one breaker serving the three front, and the other the three rear cylinders. Spark advance is semi-automatic, as formerly, and a single spark coil is used.



Sectional view of the Stromberg downdraft carburetor introduced on the Chrysler 70 and 77

Chrysler's multi-range gearshift, as its four-speed gearbox is called, is of new design. It is, of course, of the internal gear variety. The teeth in the internal gears are of considerably finer pitch than usual, and the diameters of the gears are smaller, which results in lower pitch line velocities and quieter gears. The internal gears are supported by bearings of the solid roller type, which are located immediately opposite engaging gears, so that overhang is reduced to a minimum.

The toothed dog clutch, which engages third and fourth speeds, has alternate mating teeth undercut for direct drive, and two out of three undercut for third-speed engagement. This permits about 18 deg. of relative motion during engagement in direct and about 30 deg. in engaging third, so that shifts can be made even with considerable differences in speeds of the engaging teeth in the clutch halves. Shifts from direct into third can easily be made without double clutching, and the experienced driver could even shift without declutching, although this practice is not recommended.

Standard gear reductions are:

Low—3.385 to 1	Third—1.403 to 1
Second—2.194 to 1	Fourth—1.0 to 1

The shift itself is of the normal S.A.E. type. It is intended to start the car normally on second gear, and the shift lever position for this is the same as for first gear with a standard three-speed transmission. On third gear the car can be accelerated up to 55-60 m.p.h. The fourth gear is for cross-country driving and in combination with a low rear axle ratio, results in comparatively low engine speeds. The low speed, which is for emergencies, is engaged by putting additional side pressure toward the left of the shift lever (to overcome the spring pressure of the spring lock) and then pulling backward. The elimination of the customary latch-out for the engagement of this speed considerably simplifies the handling of this transmission.

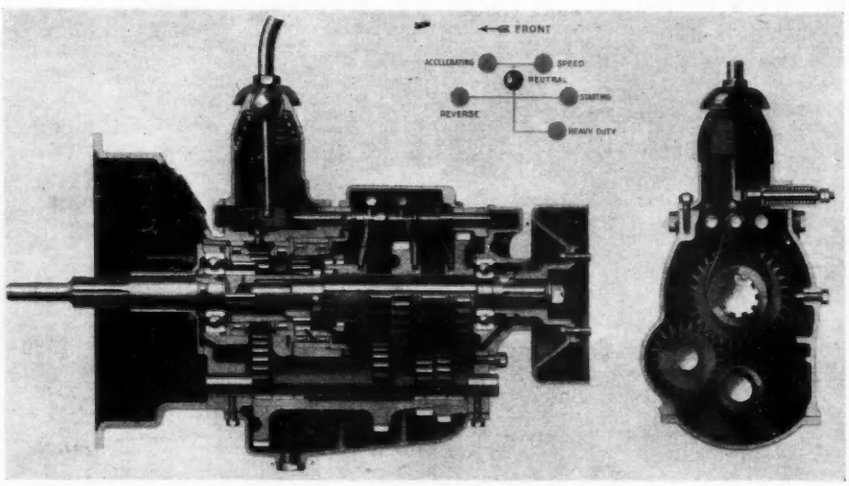
The spring lock for the engagement of this gear locks the shifter fork by means of a spring-loaded plunger in the top of the transmission case. The spring, of course, is provided to prevent accidental shifting into this gear.

Aside from the new ratio, the 77 rear axles are quite similar to those used on the 75. The tread, however, has been increased to 58¾ in. Front axles are made up of a 2¼-in. tube with chrome molybdenum ends pressed on.

Frames are considerably more sturdy than those on the 75. The channel depth is 7 in. as against 6 in., and flange width is 2⅝ in. as against 2¼ in. There is also a 5 3/16 in. higher kick-up over the rear axle, made possible by the use of flatter springs. This results in lowering the frame while still permitting ample rear spring travel.

While the front springs are nominally the same length as those of the 75, their flatter normal position gives the same result as a longer spring, since the normal spring rate on the average will be lower than with a larger camber. Rear springs are similarly affected, but are also ¼ in. longer than those on the 75. Rear springs are now also mounted parallel to the wheels, rather than to the frame as formerly.

A considerable improvement has been effected also in the spring mounting. As formerly, rubber shock insulators are used, but these have been improved in design through the addition of rubber in such a way as to give a more flexible mounting and yet reduce side-sway. Improvement in the latter is especially pronounced on the 77. The shock insulator as viewed from the front is shaped at the top and bottom in the form of a "chimney" or trapezoid. Forces which would produce side-sway are thus directly opposed at right angles to the sloping faces of the lower and upper halves. The fixed end of the spring also has wider blocks of rubber for more rigid spring mounting.



Sectional views of Chrysler 70 and 77 multi-range gearshift. The smaller view shows the plunger lock controlling the shift into low low

Another point of difference between the 77 and 75 chassis is the steering gear, which on the new model is of the cam-and-lever type. In connection with this feature it is worth mentioning that although the wheelbase has been increased 3 in., the turning circle diameter is actually 2 ft. smaller. Other chassis improvements include the increase in gasoline capacity from 15 to 19½ gal.

Many of the improvements found on the Chrysler 77 are also found on the Model 70. Its engine dimensions, viz., 3⅛ by 4¾ in. are identical with those of the Chrysler 70 produced in 1927, but, of course, the engine is considerably improved. With the downdraft carburetor and the new manifolding, this engine develops 75 hp. at 3200 r.p.m., as against 62 to 65 at the same speed for the Chrysler 65. The Stromberg carburetor itself is of identical design to that used on the 77, but has a 3/16 in. smaller venturi, the actual size being 1 3/16 in.

Comparing this engine with that of the 65, the crankshaft is considerably heavier, main bearings having a diameter of 2¼ in. and crankpins 2 in., as against 2 in. and 1⅞ in. The standard compression ratio is 5.0 to 1, or slightly less than on the 65. The muffler also has less back-pressure than that on the 65, although it is of the same general design.

Starter engagement on the new 70 is by mechanical shift as on the 77, the reduction in this case being 9 to 115. Spark plugs are also metric. The breaker, however, is operated by a six-lobe cam. A United filter type air cleaner is now used. The gas tank capacity, 19½ gal., is unusually high for a car of this size.

On the 70 is also found the multi-range transmission described for the 77 above, with the same gear reductions. A feature which was not mentioned above, but which is found on both the 77 and 70, is the use of rubber in the gearshift lever mounting to reduce the "telegraphing" of vibration and noise up through the gearshift lever and their amplification thereby.

Rear axles are continued practically as formerly, although the rear tread has been increased to 58¾ in. as on the 77 to provide wider bodies and greater rear compartment seating comfort. Frame sectional dimensions of the 70 are identical with those on the 77, although the frames are, of course, somewhat shorter in spite of a 3¼-in. increase in wheelbase over that of the 65. The 70 also has the larger kick-up at the rear, the same type of shock insulators as on the 77, and the flatter springs parallel with the wheels. On this job, however, the springs themselves are 1 in. longer in front and 2½ in. longer at the rear.

The 70 carries a worm and sector steering gear, and its 38-ft. turning radius is 4-ft. smaller than that of the 65, making for considerably easier handling in traffic and when parking.

Similarly to the 77, this model also comes equipped with a decarbonizer. On the dash is mounted a reservoir of "Carbosolve" connected to a plunger on the back of the dash. In operation this plunger is depressed with the engine speeded up, injecting the "Carbosolve" into the inlet manifold. As soon as it has reached the cylinders the engine stops, and it should be left to stand several hours, preferably over night, to give the chemical an opportunity to "dissolve" the carbon. The Chrysler Corp. recommends performing this operation every 500 miles. After each injection a new reservoir has to be installed, of course.

"Aerofoil" vanes are attached to the front of the radiator core, giving this car the appearance of being equipped with radiator shutters. Water temperature control, however, is by thermostat.

Compared with the 70 and 77 changes, those on the Series 66 are of a minor character. The bore and stroke of the engine remain the same as on the Chrysler 65, but connecting rods have been increased ¼ in. in length, now being 9¾ in. The carburetor is of the standard updraft type, with vacuum-operated economizer and single-piece manifold.

The compression ratio is slightly lower at 5.0 to 1, and the peak horsepower is 62.5 at 3200 r.p.m. Crankshafts, however, are heavier, with the same main bearing and crankpin sizes as on the 70. Starter engagement is now by mechanical shift as on the other two new models, using the same reduction as on the Series 70. Spark plugs are metric.

The transmission of the 66 is of the standard three-speed forward type, with a reduction of 3.782 to 1 in reverse, 3.114 to 1 in low and 1.691 to 1 in second. These ratios are somewhat lower than those of the 65 transmission, for greater quietness, but the difference is offset by the slightly higher rear axle reductions of 4.44 to 1 for the open and 4.7 to 1 for the closed models.

Rear axles are conventional, as is the Warner steering gear. A standard rear axle tread is used on this model. Frame dimensions correspond with those of the Chrysler 65, but springs are of the new flatter type and parallel with the wheels. While the dimensions of the springs would indicate that they are slightly shorter than on the 65, this is really not the case as far as effective length is concerned, due to the flatter normal position.

The spring shackles are now of the rubber-bushed type, with the rubber pressed between an inner

Chrysler Prices for 1930

Chrysler 66

	Pass.	Price	Doors	Gear Ratio
Business coupe	2–p.	$985	2	4.44
Roadster	2–p.	995	2	4.44
Phaeton	5–p.	995	4	4.44
Brougham	5–p.	995	2	4.70
Royal coupe	2–4–p.	1,045	2	4.44
Royal sedan	5–p.	1,065	4	4.70

Standard equipment: Wiper, shock absorbers, mirror, traffic signal, parking lights, dash gas gage, decarbonizer.

Chrysler 70

Phaeton	5–p.	$1,245	4	3.58
Roadster	2–4–p.	1,295	2	3.58
Business coupe	2–p.	1,295	2	4.1
Brougham	5–p.	1,295	2	4.1
Royal coupe	2–4–p.	1,345	2	4.1
Royal sedan	5–p.	1,395	4	4.1

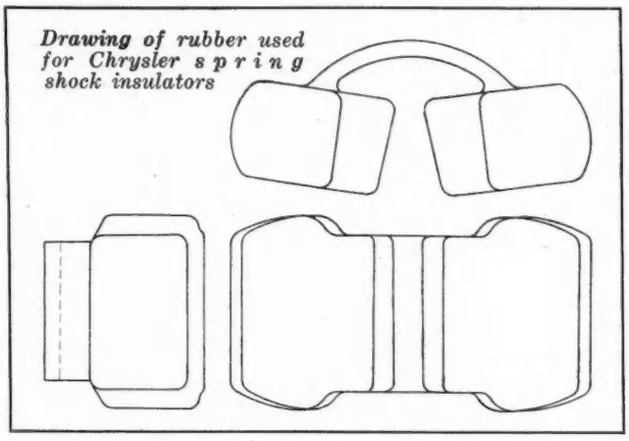
Standard equipment: Windshield wiper, shock absorbers, mirror, traffic signal, parking lights, dash gas gage, decarbonizer.

Chrysler 77

Business coupe	2–p.	$1,595	2	3.58
Roadster	2–4–p.	1,625	2	3.58
Royal sedan	5–p.	1,695	4	3.82
Royal coupe	2–4–p.	1,625	2	3.58
Town sedan	5–p.	1,775	4	3.82
Crown sedan	5–p.	1,775	4	3.82
Crown coupe	4–p.	1,775	2	3.82
Phaeton	5–p.	1,795	4	3.58
Convertible coupe	2–4–p.	1,795	2	3.58

Standard equipment: Tandem wiper, shock absorbers, mirror, traffic signal, parking lights, dash gas gage, thermometer, decarbonizer.

and an outer bushing. This design, used on a considerable number of cars in Europe, has not been introduced on American cars heretofore, but offers a great deal of promise for its further extension. As stated, it consists of three pieces, an outer shell fitting the spring eye, into which the assembly is pressed; an inner shell, somewhat longer than the outer shell, through which passes the shackle bolt, and which is firmly locked in the shackle or frame bracket, and a core of rubber between the two shells. Before assembly, the rubber core, which is fairly soft, is considerably larger in diameter than the outer shell. In fact, the assembly operation in decreasing the diameter of the rubber actually increases its length about 150 per cent.



Drawing of rubber used for Chrysler spring shock insulators

Between the naturally high friction of rubber against steel, and the compression of the rubber, there results an assembly in which outer and inner shells can be rotated relatively some 60 deg. without slippage of the rubber. In actual normal operation, of course, such high deflection will not be encountered.

Another advantage of this type of shackle is its apparent lack of susceptibility to sidesway, due to the compression of the rubber and the final relatively small thickness of the rubber itself.

The Chrysler 66 now has 11-in. brake drums with 1½ in. width of lining. Body models offered on this chassis are a roadster, touring, two-four-passenger coupe, business coupe, two-door and four-door sedans.

Mechanical Specifications of the 1930 Chrysler

	66	70	77
Overall Length	163¼	168¾	177½
Tire Size	5.50/18	5.50/18	6.00/18
Engine Make	Own	Own	Own
Number of Cylinders	6	6	6
Bore	3⅛	3⅛	3⅜
Stroke	4¼	4¾	5
Piston Displacement	195.6	218.6	268.4
Maximum Hp.	65–3200	75—	93—
Compression Ratio	5.0	5.0	5.0
Valve Arrangement	L	L	L
Camshaft Drive	Morse	Morse	Morse
Piston Material	Alum.	Alum.	Alum.
Invar Strut	Yes	Yes	Yes
No. Main Bearings	7	7	7
Crankshaft Counterbalance?	Yes	Yes	Yes
Vibration Damper	Yes	Yes	Yes
Oil Pressure to Main Bearings	Yes	Yes	Yes
Crank Pins	Yes	Yes	Yes
Camshaft	Yes	Yes	Yes
Wrist Pins	No	No	No
Timing Drive	Yes	Yes	Yes
Oil Cleaner	Filter	Filter	Filter
Air Cleaner Make	United	United	United
Engine Temperature Control	Thermostat	Thermostat	Automatic Shutters
Carburetor Make	Stromberg	Stromberg	Stromberg
Fuel Feed	Pump	Pump	Pump
Electrical Units	Delco-Remy	Delco-Remy	Delco-Remy
Battery Make	Willard	Willard	Willard
Engine Mounting	Rubber	Rubber	Rubber
Clutch Type	Single Plate	Single Plate	Single Plate
Gear Set Make	Own	Own	Own
No. Speeds	3	4	4
Universals Type	U–P	U-P	U-P
Rear Axle Type	½ Float.	½ Float.	½ Float.
Axle Make	Own	Own	Own
Torque Medium	Spring	Spring	Spring
Service Brakes	4-wheel int. hydr.	4-wheel int. hydr.	4-wheel int. hydr.
Hand Brake	Transmission	Transmission	Transmission
Steering Gear Make	Gemmer	Warner	Ross
Type	Worm and Sector	Worm and Sector	Cam and Lever
Springs	½ Elliptic	½ Elliptic	½ Elliptic
Chassis Lubrication	Zerk	Zerk	Zerk

Diesel Oil Specified by A. S. M. E. Is Suited to *Automotive Use*

Limits of requirements, tentatively fixed by research committee at Oil Power Conference, considered higher than was thought essential because of crude situation.

By EDMUND B. NEIL

WHILE the Diesel oil specifications tentatively suggested by the A. S. M. E. research committee at the Oil Power Conference held at Pennsylvania State College in June were briefly presented in *Automotive Industries'* report of the Conference appearing in the July 6 issue, limits of space available then prevented further mention of this important development in prospective fuel standardization.

A study of the report indicates that while the specifications themselves are in the usual brief form, each item was considered carefully before its establishment. It is particularly interesting to note that neither specific gravity nor B.T.U. values form a part of the specifications themselves, although they are given in the "Informative Notes" following them. It is suggested that the former be given so that the weight per gallon of the fuel can be computed, and that the latter can be determined approximately by the formula

17,680 plus (60 x Baumé Gravity)

It is also recommended that in localities where low temperatures are experienced, arrangements for suitable fluidity should be made between purchaser and seller.

The committee agreed that sulphur is not as serious an offender as has been assumed in the past. Furthermore, the crude oil situation and the resulting purchase price of the fuel practically forced the users of Diesel engines to go to a higher limit than they had agreed to accept previously. For this reason the limits set by the specifications may be considered somewhat higher than was thought essential in the past. Viscosity was thought to be one of the most important factors, as it determines the fluidity of the oil and at a given temperature is an index of how readily the fuel will atomize and how it will affect the injection pump. All of the qualities once thought to be represented by the gravity are now known to be produced by the viscosity. The maxima established may still be considered high by some manufacturers and users, but to meet all of the requirements of two Diesel fuel specifications, it would be necessary to go to these limits.

There are certain Diesel engine manufacturers who place much importance in the percentage of carbon residue in a Diesel fuel, while others apparently do not understand the term or else do not wish to express their views upon it. Consequently the research committee feels that the percentages tentatively established are open for discussion, but yet are in line with the type of oil best represented by the term "Diesel fuel."

From the standpoint of insurance regulations, a legal stipulation of 150 deg. F. minimum flash is thought acceptable.

The boiling point range of Diesel fuel usually extends to temperatures high enough to result in considerable decomposition or cracking when an attempt is made to distill these oils at atmospheric pressure. Therefore a distillation test carried out under that condition has little value in most cases. While the committee feels that distillation under high vacuum is a splendid research tool, the difficulties of operation preclude the possibility of using this method in routine testing, hence the boiling point range is not included in the specifications.

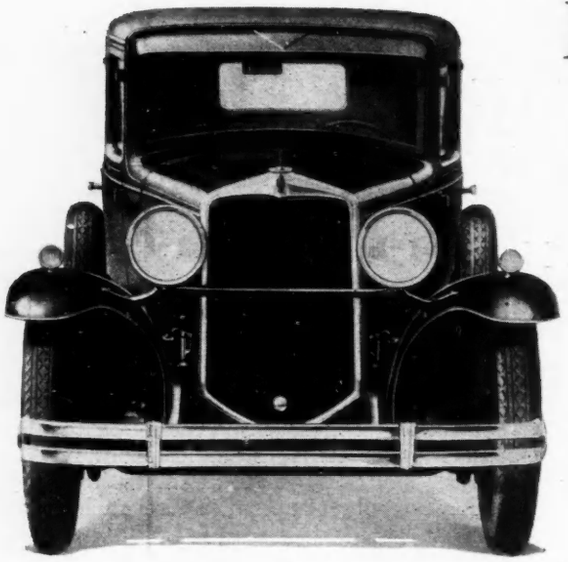
Ed. Note. The Research Committee is extremely anxious to obtain the opinions of manufacturers and operators concerning the specifications, and it is understood that fuel oil made up to them is to be made available for test in service through any of the oil companies whose representatives are a part of its membership. *Automotive Industries* would be pleased to forward to the Committee any comments or requests for information that may be received.

The advisability of formulating a third specification for the commonly known "Bunker C Fuel Oil" is being considered, but difficulties incident to the use of this fuel under boilers as well as in engines have precluded further action up to this time.

Tentative Diesel Fuel Oil Specifications

	Heavy Duty Engines	Light High Speed Engines
Viscosity at 100 deg. F. (Saybolt Univ.)	Max. 200 sec.	Min. 45 sec. Max. 100
Sulphur	" 3% by wt.	Max. 2%
Conradson	" 5%	" 1%
Ash	" .08%	" .02%
Flash	Min. 150 deg. F.	Min. 150 deg. F.
Moisture and Sediment	Max. 1%	Max. 5%

Hupp Enters $1,000 Price Class In Four Body Styles



Front view of the Hupmobile Model S coupe, showing the raised Vee in the sun-visor, in keeping with the pointed radiator shell outline

Mechanical features are practically identical with those of former Century Six and Model A Hupmobiles.

WITH the announcement of its Model S Hupmobile, a six-cylinder car in four body types, the Hupp Motor Car Corp. enters the $1,000 price class. The mechanical components are for the most part practically identical with those of former Hupp models, the engine, clutch and transmission being similar to those of the Century Six, and the rear axles similar to those of Model A, while the novelties are chiefly in connection with body design.

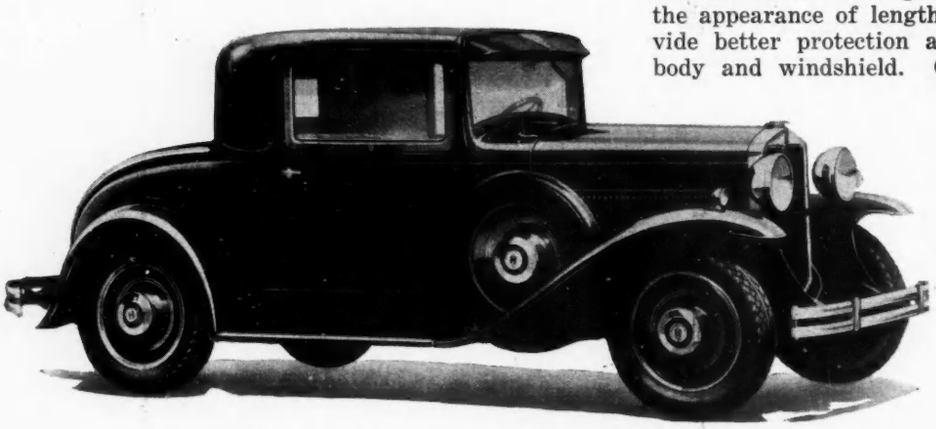
Prices for the various body models are as follows:

Commercial coupe	$ 995	2-4-p. cabriolet	$1,070
5-p., 4-door sedan	1,060	Phaeton	1,100

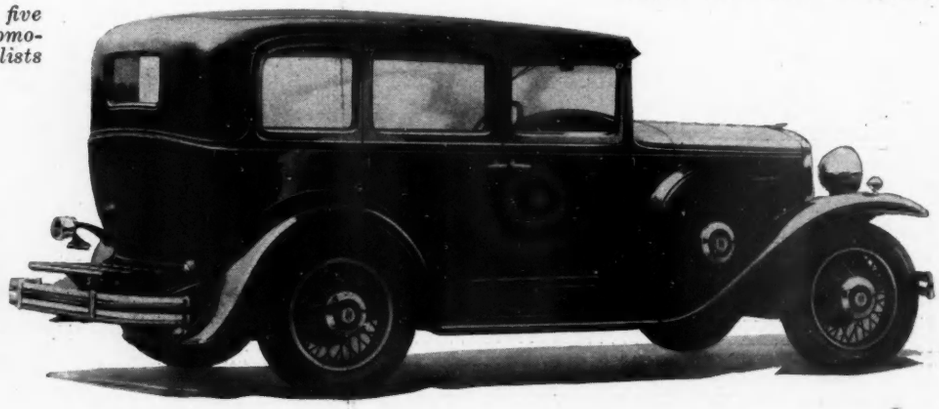
Of these cars, the commercial coupe comes equipped with five disk wheels, the spare being mounted in the right front fender well. Wood wheels are provided on the other models. The phaeton especially embodies new design features, the top of its cowl being extended back from the windshield to form a "tonneau-cowl" for the front compartment, and the doors being made of unusual shape to enable them to open more widely.

Body features new in character, which are found on all body models, include the long sweeping front fenders and shortened running board, which not only increase the appearance of length, but also are claimed to provide better protection against mud splashing on the body and windshield. On top of these fenders are mounted the parking lights, an unusual feature for a car in this price class.

A gracefully curved apron is provided which comes to a point below the center of the radiator. Windshields are of the slightly sloping type designed to reduce glare and reflections from the rear in night driving. A three-spoke type of steering wheel has been adopted,



This commercial coupe, with its five demountable disk wheels, is Hupmobile's lowest-priced car now. It lists at $995



Listing at $1,060, this Model S four-door sedan is notable for its exceptional roominess for a car of this price. Note also the fender parking lights and long sloping front fenders

With Six-Cylinder Model

and all controls except the horn-button have been removed from it to the dash. The accelerator is of the treadle type, but at the forward end curves to the left. It thus provides a comfortable rest for the man's broad shoes and also makes driving easier for the woman with high heel shoes, in which case the pedal operates in effect like a button type of accelerator.

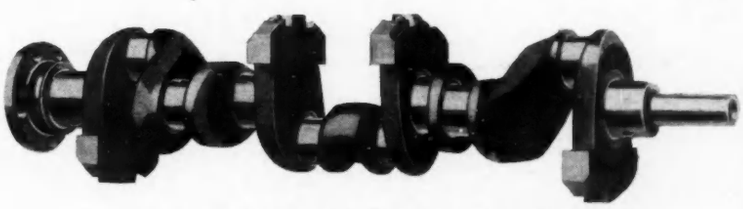
Another change in controls consists in the removal of the starter switch from the floor board to the dash, just above and slightly to the left of the steering column bracket, where it is easily accessible with the left hand. Another change is in the double filament control switch location, this switch now being of the foot-operated type and placed just to the left of the clutch pedal on the floor board.

In the engine, the major changes consist of the adoption of a new type of cylinder head, and the full counterbalancing of the crankshaft for greater smoothness. Bore and stroke remain at 3¼ by 4¼ in., and the engine is said to develop 70 hp. at 3200 r.p.m.

The clutch is continued from the former design, a single plate Borg & Beck. Transmissions are also derived from the Model A, have three speeds forward, and are equipped with anti-friction bearings throughout, with the exception, of course, of the reverse idler.

Rear axles are of Salisbury make, semi-floating, and Timken-bearing equipped, with double bearings at the wheel ends. Pinion shaft and pinion are integral and are also supported on two opposed Timken roller bearings. The standard final reduction is 4.7 to one, and a reduction of 5.22 to one is available at extra cost, if desired.

Interior view of the front compartment of the Hupmobile closed Model S showing the new style accelerator pedal, absence of controls on steering wheel, starter switch at left on the dash, and "dimmer" control to the left of the clutch pedal on the floor board

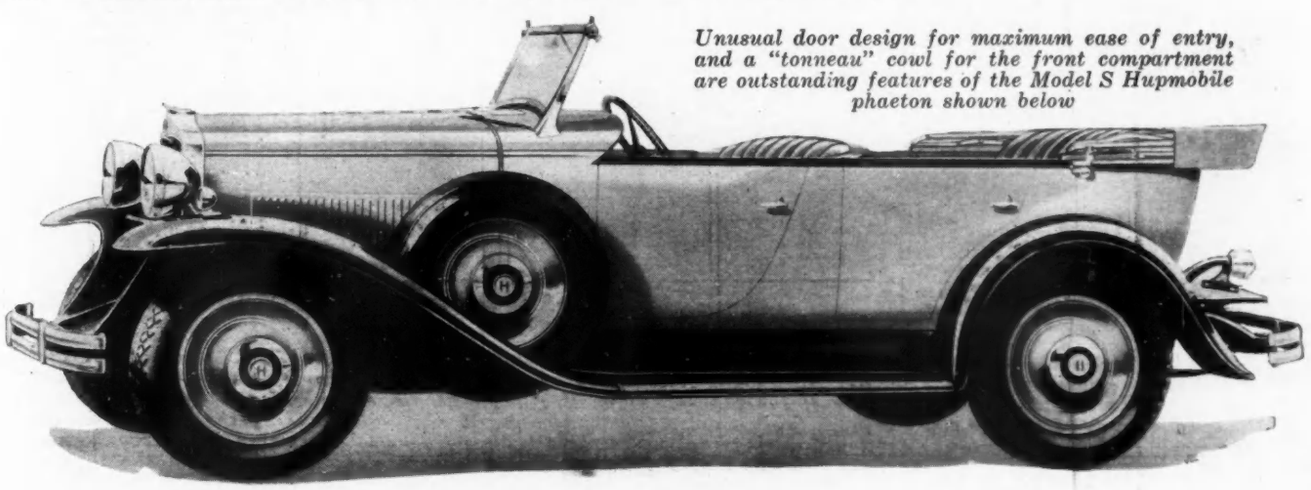


The crankshaft of the Hupmobile six-cylinder engine is now fully counterbalanced

Springs are semi-elliptic all around, shackled at the front and of practically the same length as those used on the Model A. Monroe hydraulic shock absorbers are included as standard equipment in the suspension system. These shock absorbers are featured by a thermostatic valve, consisting of a conical disk controlling the oil flow aperture, the function of this design being to provide consistent operation without the need of adjustment even when climatic conditions are extremely variable.

Tires are 29 by 5.25, standard. A top speed of 70 m.p.h. is claimed, together with an acceleration of from 5 to 25 m.p.h. in 7 sec.

Unusual door design for maximum ease of entry, and a "tonneau" cowl for the front compartment are outstanding features of the Model S Hupmobile phaeton shown below

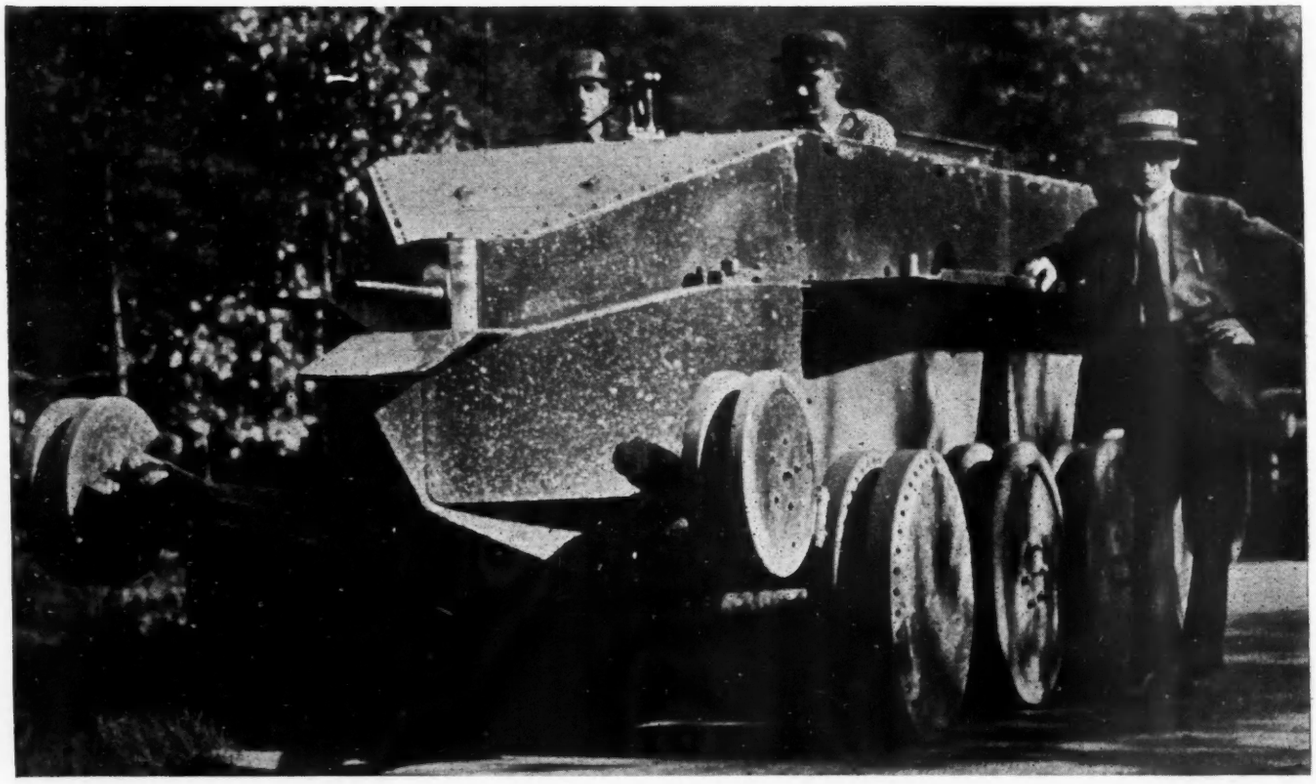


The new car is being built in the newly acquired Cleveland and Fostoria, Ohio, plants of the Hupp Motor Car Corp. Since the discontinuance last year of the Chandler models, these plants have been retooled almost completely for the production of the Model S Hupmobile.

Hupmobile Model S Specifications

Bore and stroke	3¼ x 4¼
Make and model	Own
Cylinder arrangement	6 in line
Crankcase integral	Yes
Piston displacement	211.6 cu. in.
Maximum brake hp. at r.p.m.	70 at 3200
Piston material	Cast iron
Piston weight	20.96 oz.
Number of oil rings used per piston	One
Number of compression rings used	Three
Wristpin	Locked in piston
Crankshaft counterweights	4
Main bearing material	Bronze backed babbitt
Number of main bearings	4
Camshaft drive	Chain
Timing chain, make	Morse
Intake valve head material	Nickel-Chrome
Exhaust valve head material	Silchrome No. 1
Lubricating system type	Pressure
Oil pressure to main bearings	Yes
Oil pressure to connecting rods	Yes
Oil pressure to wristpins	Yes
Oil pressure to camshaft bearings	No
Normal oil pressure	30 at 30 m.p.h.
Capacity of oil reservoir	6 quarts
Oil rectifier, make	Purolator
Gasoline tank capacity	15 gal.
Fuel feed type	Vacuum tank
Gasoline filter, make	Stewart-Warner
Carburetor make and model	Stromberg U-2
Carburetor size	1¼
Carburetor type	Plain tube
Intake mixture heated how	By exhaust
Air cleaner, make	Handy
Cooling circulation	Pump
Water pump drive	Belt
Thermostat	Yes
Cooling system capacity, gal.	3½
Ignition unit, make	Auto-Lite
Spark plug thread	Metric
Battery make	Willard
Starting motor, make	Auto-Lite
Generator, make	Auto-Lite
Generator driven by	Chain
Clutch, make	Borg & Beck
Clutch, model	9-R-D
Clutch facing inside diameter	6⅛
Clutch facing outside diameter	8⅞
Transmission, make	Detroit Gear
Transmission, location	On engine
Rear axle make	Salisbury
Rear axle type	Semi-floating
Minimum road clearance at center of rear axle	9¼ in.
Type of final gearing	Spiral bevel
Gear ratio, standard 5-passenger 4-door sedan	4.7
Tire size	29 x 5.25
Wheels, type	Artillery
Optional axle ratio	5.22:1
Front spring, type	Semi-elliptic
Front spring, make	Mather
Front spring, material	Silico-manganese steel
Front spring, size	36½ by 1¾
Front springs, shackled	Rear
Rear spring, type	Semi-elliptic
Rear spring, make	Mather
Rear spring, material	Silico-manganese steel
Rear spring, size	53 by 1¾
Spring shackles, make	Tryon
Steering gear, type	Cam and lever
Steering gear, ratio	15.5:1
Car turning radius	20.3 ft.
Foot brakes, make	Steeldraulic
Number of complete brakes	4
Foot brake, type of mechanism	Internal
Foot brake, method of application	Mech.
Total area of foot brakes	193.1 sq. in.
Frame material	No. 1025 steel
Frame depth	6½ in.
Frame thickness	⅛

High Speed Armored Combat Tank



The eight-wheeled armored combat tank pictured above was demonstrated recently before U. S. Army officers and official representatives of the American Automobile Association at Fort George C. Meade, Maryland. J. Walter Christie is the designer and constructor of the vehicle. Capt. R. A. Leavell, official timer for the A.A.A., certified the speed records of 42.55 m.p.h. over open fields and 69.23 m.p.h. on paved highways made by the tank. Like the slow-moving, creeper-type tanks developed during the war, it lays endless tracks when moving over irregular unpaved terrain. In 10 minutes the tracks can be removed and stored in lockers along the sides, and the tank is ready to travel as fast as a high-speed passenger car on improved roads

Just Among Ourselves

No Dullness in Sight For Machine Tools

WHATEVER total automobile production for the last six months turns out to be, the makers of machine tools and factory equipment for automotive plants would seem to be in for a continuance of pretty good business. Having just returned from a trip to a number of car factories, we are impressed with the continual change that is going on and that is still being planned in a multitude of manufacturing operations. In one or two plants, for example, where production has fallen off considerably as compared with the first part of the year, the management is about to complete some important realignments in production equipment which it had to hold up until now because demand for cars has been so great as to make impossible the necessary interruption of schedules previously.

* * *

Design of Future Equipment Needs Logical Imagination

THIS last trip emphasized, too, an impression which has been strong in our minds for a long while; an impression that the tool or equipment manufacturer who manages to get the closest to the detailed daily problems actually confronting minor manufacturing executives stands by far the best chance to keep ahead of the procession from year to year. It is natural, as well as logical and necessary, for the equipment maker to concentrate most of his energies on selling the tool or piece of equipment which he has already for sale. But his permanent stability rests on his ability to keep designing new equipment to meet new, practical needs.

Real progress for the equipment maker, it seems to us, lies primarily in making the design of his new products a natural and logical outgrowth of a vast amount of detailed knowledge of practical needs within automotive factories, rather than merely designing a more efficient model of a type of tool previously manufactured.

More tool design thinking, in other words, might be in terms of what questions are bothering automotive production men, than too strictly in terms of new models of old tools. Imagination may play an even greater part in the future than in the past in both tool equipment and vehicle design.

* * *

Efficiency's Objective Is More Than Beauty

SAT in on an interesting argument between an automotive engineer and his wife the other evening about beauty of industrial plants in general and the relative beauty of American and Canadian plants. American factories in perspective, this woman claims, are considerably more ugly and dirty than those on the Canadian side. Why shouldn't we have a bit more beauty combined with our efficiency, she argues?

Our engineer friend pointed out — granting for the moment the existence of the fact stated—that had American executives concentrated more on beauty and less on efficiency, we would probably be riding around in 1929 in automobiles which looked and performed like those of 1915 actually did, and that our physical comforts all along the line probably would have been decreased in relative proportion.

"It isn't entirely, or even largely, a matter of money," he insisted. "It is chiefly a matter of objective and psychological approach to the problems of industry. The type of mind which reacts quickly and emotionally to beauty would be very likely to lack the intensive desire for profit and efficiency which has been necessary to produce the physical comforts which America has available at a relatively low cost per unit.

"Would you be willing to give up those comforts to obtain the beauty? If so, you are fully justified in maintaining your point of view. If not, you are inconsistent."

For convenience sake we forget just how the discussion ended, but we considered it thought-provoking enough to relate.

* * *

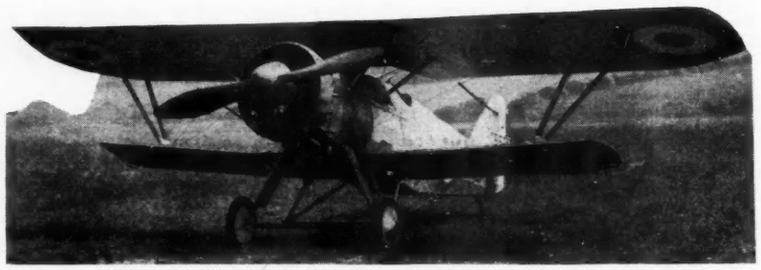
The Race Rules Debate Should Become General

DON'T believe anything of more general interest has been printed in *Automotive Industries* for some time than the Moscovics-Rickenbacker argument about the 1930 rules for the Indianapolis race. Unless we are greatly mistaken, the circulation of these two articles will be but the starting point of a general debate which bids fair to carry on for some months. Certainly we are going to be glad to devote some more space to the argument in this magazine just as long as constructive discussion continues to come in. Glad to have any one of our readers drop us a line on the subject.

However spirited the debate may become, we have the feeling that the result is likely to be a greater interest in and attendance at the 1930 Indianapolis race than at any previous speedway classic in a good many years.—N.G.S.

Air-Cooled Engines and Metal Held for the *First Time After*

Noticeable progress seen in design of powerplants, with display of compression-ignition type unit marking a new phase. Comparatively few American craft exhibited.



The Armstrong Whitworth Siskin 111B, as exhibited at the London Aero Exhibition, showing the Townend Ring cowling designed to reduce air resistance

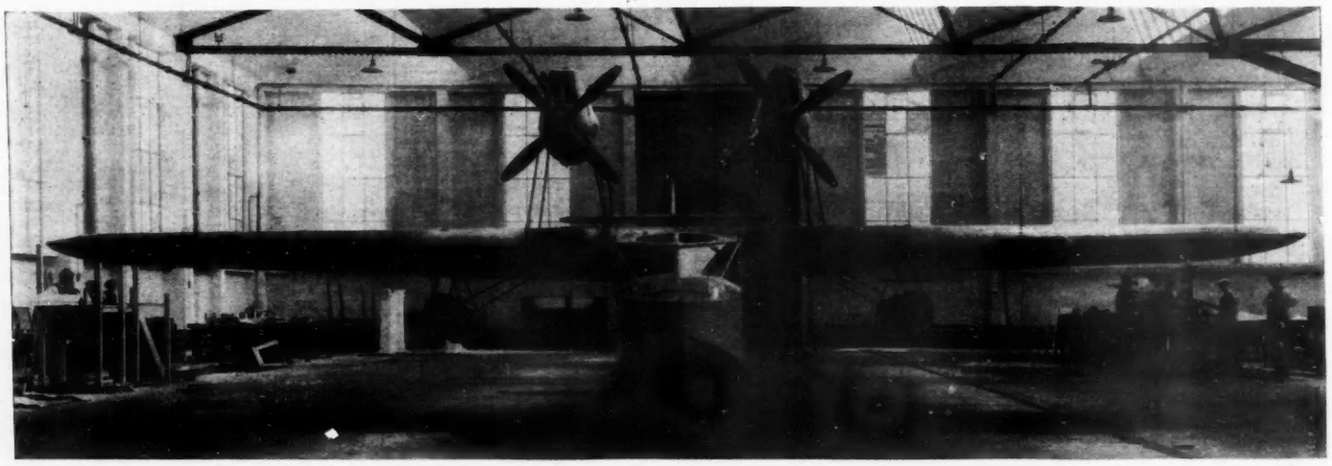
AFTER an interval of ten years, an Aero Exhibition, international in character, although including comparatively few American exhibits, was staged at Olympia, London, last month. Of the two main branches—engines and aircraft—there was more noticeable progress in the latter section. Detail design in both sections showed definite improvement and workmanship left nothing to be desired. Generally speaking, however, the high prices asked for nearly all products exhibited are likely to form a serious deterrent to more rapid development from a commercial standpoint.

Dealing first with power units, the tendency noticed at the Paris Show of 1928 to employ air-cooling more extensively was continued at Olympia. Engines suitable for installation in the light airplane class of machine now have air-cooling exclusively, the two general types most commonly employed being the four-cylinder-in-line and the radial, the latter with 5, 7 or 9 cylinders.

The de Haviland "Gypsy" (four-cylinder-in-line, air-cooled), developing 98 hp. at 2100 r.p.m.), has in a comparatively short time been very widely adopted, and an example shown was a standard engine taken at random from stock that completed 502 hours in the air in a test officially observed by the British Air Ministry. The A.D.C. "Cirrus" and "Hermes" engines having similar layouts were also seen installed in a number of light airplanes.

Among the larger class of air-cooled power units the radial reigned practically supreme, although one six-cylinder engine—the A.D.C.—indicated a tendency to extend the range of the in-line type. In the large variety of air-cooled radials shown by both British and European makers, the biggest was the Armstrong-Siddeley 14-cylinder "Leopard," which develops a maximum of 805 hp. in the direct drive model, and 860 hp. in the model fitted with a reduction gear.

To reduce air-screw tip speed and thus increase propeller efficiency, a number of power units in the high-power class were fitted with reduction gears. Whereas until recently this feature has been more or less exclusive to water-cooled engines, many air-cooled radials now



View of the Saunders "Cutty Sark" model seaplane, equipped with two A.D.C. Hermes engines, as shown at the London Aero Exhibition

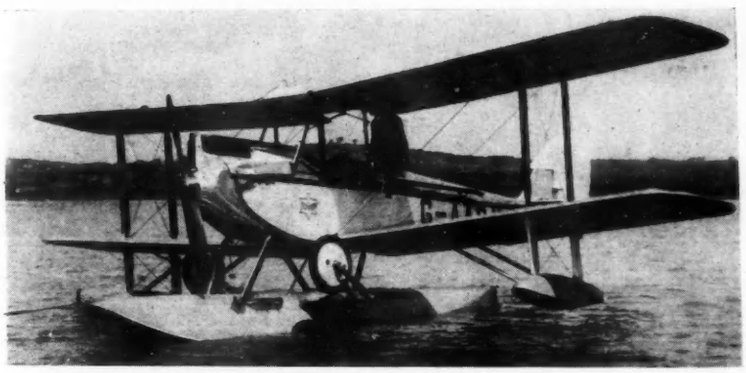
Planes Dominate *London Aero Show* *an Interval* of Ten Years

By A. HESSELL TILTMAN
B. Sc. A.F.R.Ae.S.

The Army was represented at the Exhibition by the Bristol Bulldog, a single-seater fighting plane, equipped with a Bristol Jupiter engine

incorporate it as an option. Cooling difficulties by no means have been lessened by the consequent decrease in slip-stream velocity, though general performance shows a distinct increase when associated with reduction gears.

An attempt to minimize the large frontal area of the radial engine which results in loss of performance is represented by the Townend Ring illustrated herewith, for which is claimed a definite increase of speed due to improved airflow past the cylinder heads.



The de Haviland Moth amphibion, which received first mention at the Exhibit for its comparative lightness

The Redrup Lever engine is an interesting novelty of unorthodox design. It develops 90 hp. and has its cylinders arranged parallel to the propeller shaft; the connecting rods are fitted with universal joints and act upon a type of swash plate mounted on a single-throw crankshaft set at an angle to the bearings.

Superchargers fitted to both air-cooled and water-cooled engines were much in evidence at the show. On a Rolls-Royce H10, a 12-cyl. V-type water-cooled engine developing a normal hp. of 825, the supercharger comprises a high speed centrifugal fan mounted co-axially with the crankshaft and driven through a planetary gear. One of the most powerful engines at the show was the 18-cyl. Isotta Fraschini which develops 1070 hp. at 1850 r.p.m.; the cylinders were arranged in three banks of six.

A new power unit, and one which may have some appreciable effect upon the future of aviation, is the Sunbeam Coatalen six-cylinder water-cooled compression-ignition engine; it has a piston displacement of 8822 c.c. and develops 100 hp. at 1500 r.p.m. The fuel consumption, using heavy grade crude oil, is given as 0.4 pint per b.hp. hour. It is said to be started without auxiliary apparatus. (This engine was described in *Automotive Industries* of August 3.)

Developments in airplane design shown in the many types exhibited indicate a trend which may be summarized as follows:

1. A rapid change over to metal construction in all classes of machines.
2. The progressive development of the flying boat.
3. The popularity of the monoplane.
4. The adoption of wheel brakes; in certain cases wheels displaced the previously used tail skid.
5. The rapid evolution of the light airplane.
6. Greatly improved detail design, the consequent decrease in structure weights and increased factors of safety.
7. The advance in technique in the use of thin gage metals.
8. The popularity of the cabin machine and the coupe.

In the light airplane class, first mention must be made of the de Haviland "Moth." This machine in its various forms (landplane, seaplane, amphibion and fitted with skis, either with open cockpit or with coupe head) has aided considerably in popularizing flying. As an amphibion the "Moth," completed only just prior to the opening of the Olympia Show, has distinct possibilities, especially as its weight is only 26 lb. more than the standard seaplane.

Other examples of the light airplane worthy of mention are the two-seater Blackburn "Bluebird," the Avro "Avian," the Simminds "Spartan" with interchangeable planes and control surfaces. the all-metal Junkers two-

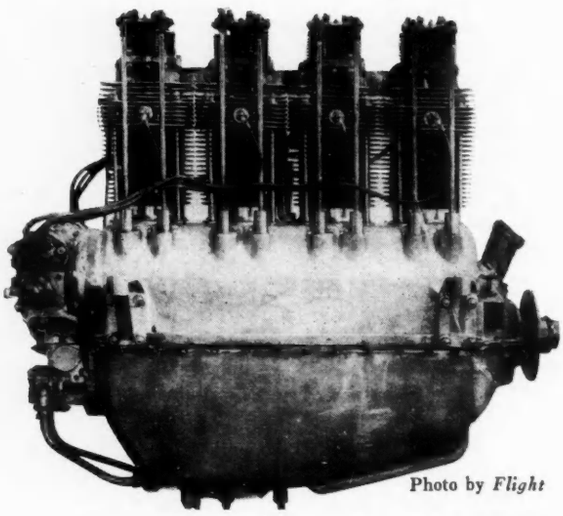
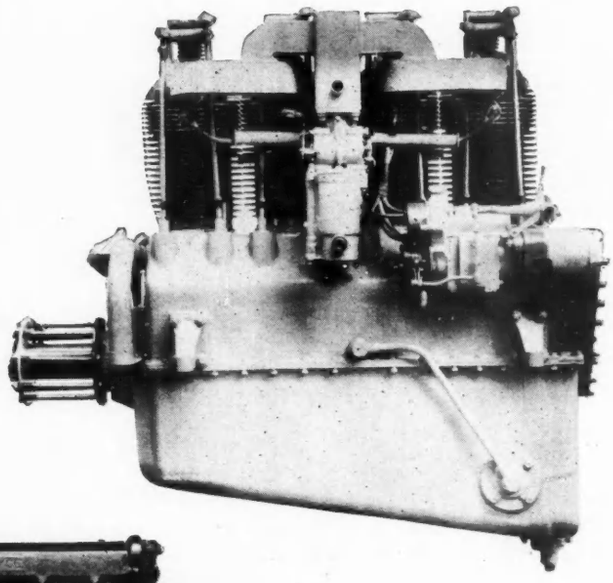
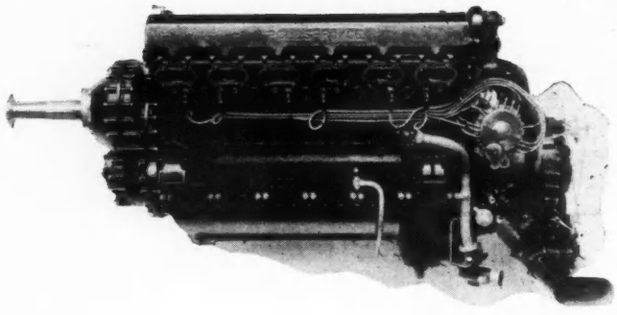


Photo by *Flight*





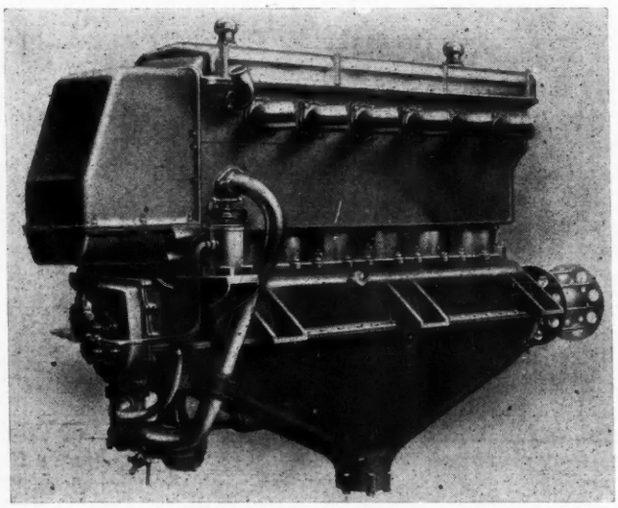
Three powerplants exhibited at the London Aero Exhibition. To the left above is the de Haviland "Gypsy," which develops 98 hp. at 2100 r.p.m. In the center is the Rolls-Royce H 10, equipped with a supercharger. Above to the right is the Hermes four-cylinder engine, recently developed by the makers of the Cirrus, and which is rated at 105 to 115 hp.

seater "Junior" and the Klem-Salmson. It may be remarked that some designers in this class seem to have overlooked the great importance of folding wings from the standpoint of a large proportion of potential users.

The new Junkers machine is built along the lines of other Junkers craft with low set cantilever wings, the middle sections of which are integral with the fuselage. The whole machine, including the fuselage and steering organs, is made of duralumin with steel fittings and is covered with corrugated sheet duralumin.

The wings have thick sections and taper toward the tips. They are fitted to the middle section by four cap nuts apiece. Each wing has four tubular spars joined in the fashion characteristic of Junkers with short transverse stays of pressed duralumin. The stays are arranged in triangular form, making for great rigidity and distributing the strains evenly through the whole structure. The span of the wings is 32.8 ft. and together with the long, narrow and uncompensated ailerons they have a bearing surface of 135.6 sq. ft.

The fuselage is built up of upright transverse frames formed of tubes, longitudinal support being given entirely by the corrugated duralumin skin. There are two open cockpits, the rear one for the pilot and the forward one for the passenger or student.



The Sunbeam-Coatalen compression-ignition engine

The rudders, consisting of duralumin and built up in the same manner as the rest of the plane, are unbalanced. The stabilizer may be adjusted on the ground, but the vertical rudder fin is fixed. Ball bearings are employed throughout the controls. The stabilizer has an area of 12.9 sq. ft. and the elevator 10.7 sq. ft. The rudder fin measures 3.76 sq. ft. and the rudder itself 6.45 sq. ft. The control is effected by a stick and pedals in combination with rods and cables. Easily detachable controls are provided for the forward cockpit.

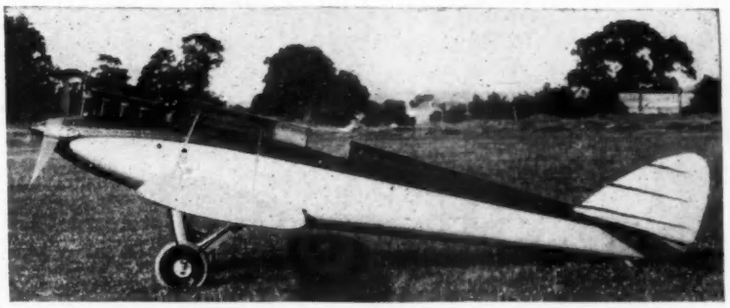
The running gear is of the divided type with a 5.9 ft. track and the wheels are shod with 6.10 x 85 mm. tires. They may be exchanged for snow-skids or floats. These have flat bottoms and several compartments. Each float has a total volume of 550 liters.

Power is supplied by a five-cylinder radial Genet engine made by Armstrong-Siddeley, of England, and developing 80 to 88 hp. There are two fuel tanks in the middle section of the wing, each containing 40 liters, from which the fuel is supplied by a diaphragm pump. An emergency gravity tank holding 12½ liters is also furnished, it being charged from the main tanks by a hand pump. The oil tank also holds 12½ liters.

The total length of the machine is 22.8 ft. and its greatest height with the tail skid on the ground

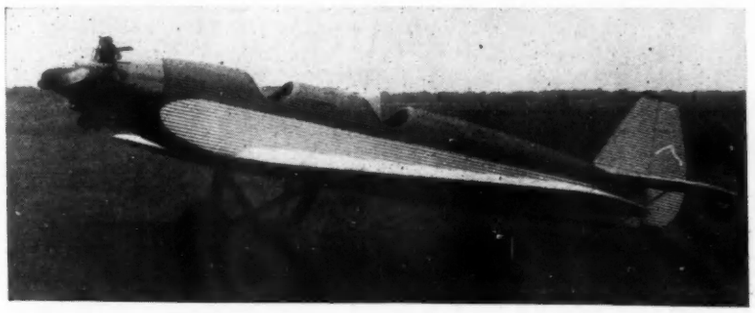
and the propeller in horizontal position 6.56 ft.

With a flying weight of 1102 lb. the plane has a load of 8.1 lb. per sq. ft. of wing area. The load on the engine is 13.7 lb. horsepower engine output. The machine is calculated to attain a maximum speed of just over 100 m.p.h. The cruising speed is around 85 m.p.h. and the landing speed about 45 m.p.h. The machine can keep in the air for 5 hours and has a service ceiling of 14,750 ft.



Single-seater de Haviland Tiger Moth, an example of the light plane exhibited at the London show

Among airplanes designed for the private owner but somewhat larger than what is usually inferred by the term "light airplane" were two machines having accommodation for pilot and three passengers, and ample room for luggage. One was the de Haviland "Hawk Moth," a high-wing semi-cantilever monoplane with totally enclosed cabin and provision for folding the wings. It was most attractive proposition in a class somewhat larger than the two machines just referred to. It appeared as an all-metal monoplane, with accommodation for a crew of two and twelve passengers.



View of the Junkers Junior monoplane, developed by the German builders of commercial transports

A large number of military machines added interest to the show in another field. These range from the Parnall "Peto" seaplane, designed for stowage in a submarine, to several examples of large twin-engined bombers and flying boats. A particularly fine example of all-steel construction in this field is the Bristol "Bulldog" with a Bristol "Jupiter" engine and carrying two machine guns and the full equipment of a single-seated fighter.

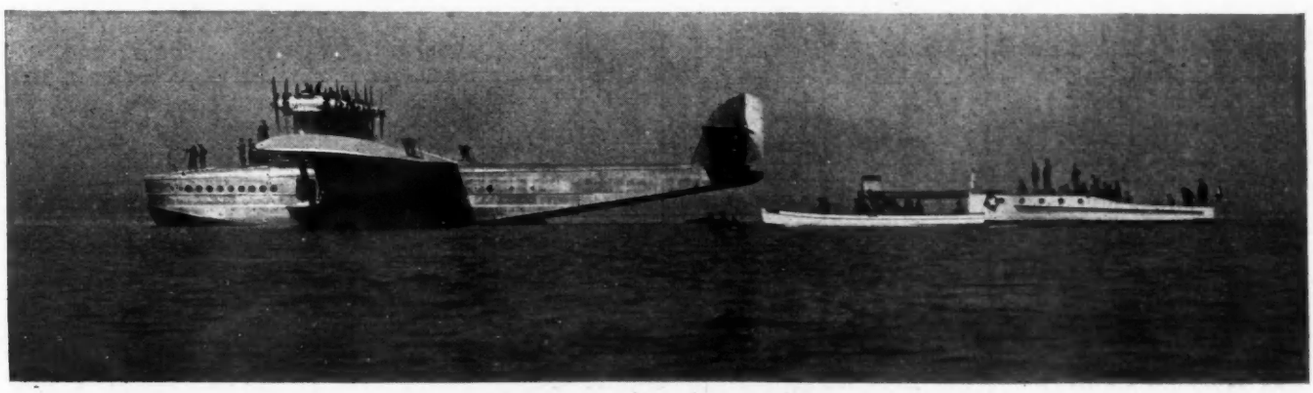
Several racing machines appeared, among them the Supermarine S5, the Gloster seaplane and the de Haviland "Tiger Moth." The Gloster Aircraft Company also exhibited a large twin-engined machine specially designed for aerial survey work; this, too, was of all-metal construction intended to operate at high altitudes.

Among the many other machines shown was one of more than passing interest, viz., the Dornier DO X, which is the largest airplane yet built and underwent its preliminary trials during the first week of the show. It has a span of 159 feet, accommodation for 100 passengers and a fully loaded weight of 35 long tons. This ship was described in *Automotive Industries* of Aug. 3.

shown fitted with an Armstrong-Siddeley "Lynx" radial engine and is reminiscent of certain American machines that were the first to popularize this type of aircraft. The second machine referred to was the Saunders "Cutty Sark," a flying boat having an "Alclad" hull with a cabin top over the cockpit; its cantilever monoplane wing structure has mounted above it two A.D.C. "Hermes" engines with tractor air-screws.

The Ford "Trimotor" was shown, with three Pratt & Whitney "Wasp" engines, and was considered a

Dornier Seaplane on Lake Constance



Above is shown a photograph of the Dornier DO X, taken during the trial flights of the seaplane on Lake Constance, Switzerland, last month. The size of the plane may be visualized by comparison with members of the crew shown on the cabin roof, as well as the figures in the attendant boats

Spark Governor Controlled by Engine Load Proposed

British engineers attempt to establish an approximate relation between the throttle position and torque, suggesting a linkage between the former and the ignition unit.

AUTOMATIC spark control dependent upon throttle position, in addition to automatic control dependent upon engine speed, is proposed in a paper recently read before the Institution of Automobile Engineers (Great Britain) by H. S. Rowell and C. G. Williams, B.S. It is shown in the paper that the optimum spark advance depends not only on the engine speed but also on a number of other factors, including the load on the engine, which is measured by the inlet vacuum. However, controlling the advance directly by the inlet vacuum is inconvenient for a number of reasons. The torque load on the engine is not a direct function of the throttle position, but there is a relation between them which involves also the engine speed. The authors' attempt to establish an approximate relation between throttle position and load and suggest a linkage between the throttle lever and the ignition unit which shall give the proper variation in spark timing to compensate for the effects of variations in engine torque load.

The paper referred to covers the subject of automatic spark advance in a comprehensive manner. It is based partly on a study of the literature of the subject and partly on experimental work carried out for the Research Association of the British Motor and Allied Manufacturers.

The need for advance of the spark with the speed of the engine is well shown by Fig. 1, which is based on test results obtained with an overhead-valve, six-cylinder automobile engine of 158 cu. in. displacement. The engine was run on fixed throttle throughout, but, whereas in one set of tests the spark advance was carefully adjusted to give maximum power, in the other the ignition was fixed at 12 deg. advance, which was the optimum, and the maximum advance possible without incipient knocking at the lower speeds. From the chart it will be seen that at 2000 r.p.m. with advanced ignition (30 deg.) the engine gives 21.3 per cent more power and consumes 12.7 per cent less fuel per b.hp.-hr. than with fixed ignition of 12 deg. Varying the spark advance with the speed of the engine for optimum results increases the acceleration of the car and its maximum speed. A late spark, moreover, has the effect of increasing the exhaust temperature, and with the six-cylinder experimental engine on which Fig. 1 is based, a retarded spark under conditions of wide-open throttle, high-speed running will cause the exhaust manifold to become red hot in a few minutes.

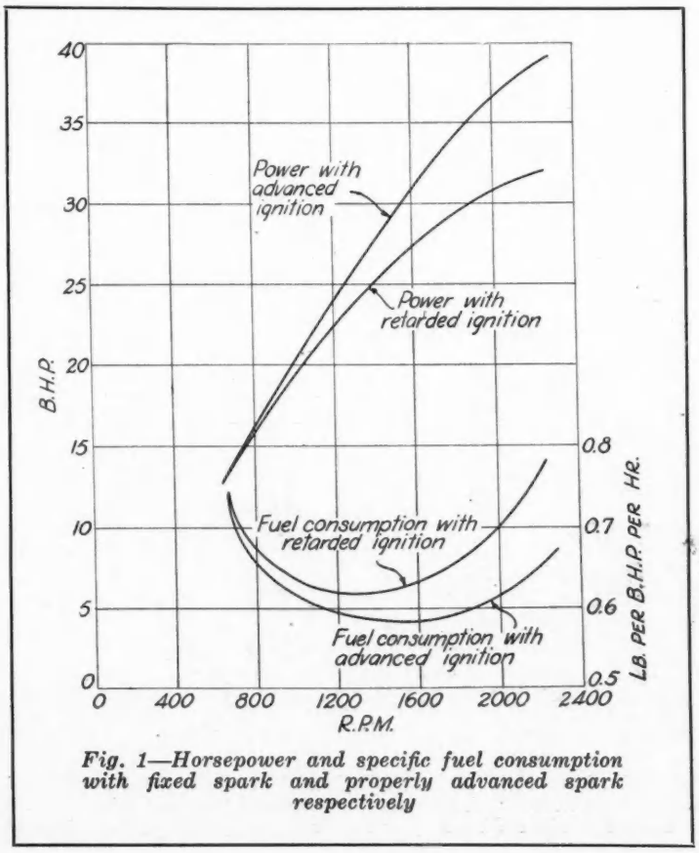


Fig. 1—Horsepower and specific fuel consumption with fixed spark and properly advanced spark respectively

The optimum spark advance does not depend solely upon the speed of the engine but also upon quite a number of other factors, which are summarized in the following:

1. Engine size, shape and speed.
2. Turbulence of the explosive mixture.
3. Air-fuel ratio of the explosive mixture.
4. Exhaust gas dilution of the explosive mixture.
5. General condition of the engine.

Under the first heading may be included the number and location of spark plugs, compression ratio, valve timing and such geometric factors. Turbulence is not an independent variable, since it is affected by many of the factors under (1). Under (3) the effects of distribution errors in multi-cylinder engines must be included, and the effects of hot-spotting or other preheating method, which cannot be ignored. The nature of the fuel itself is often of some importance.

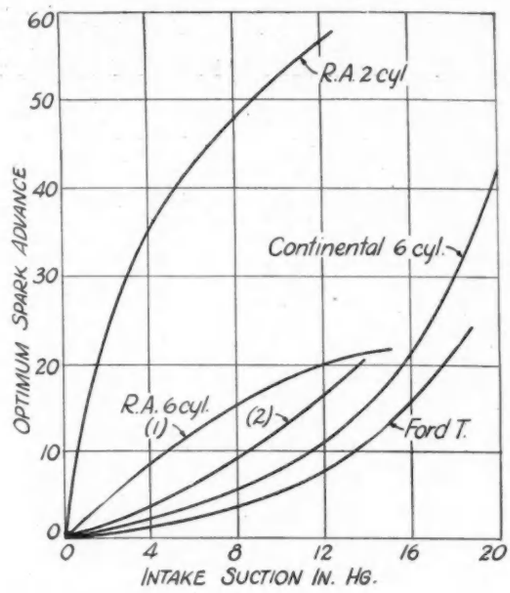


Fig. 2—Relation of optimum spark advance to inlet vacuum in different engines

Exhaust dilution is an important variable but not independent of speed, valve timing and similar factors mentioned under (1). Under general condition of the engine may be understood such matters as carbonization of surfaces, and wearing of parts which in the new state of the engine are practically proof against leakage. From the above discussion it will be understood that the *a priori* design of an automatic spark timing device is by no means simple.

If it is assumed that combustion of the charge takes a definite time, then the fraction of the cycle over which combustion extends is evidently proportional to the engine speed. That the time of combustion is independent of the speed is not generally admitted, however. Ricardo has made the assumption that the speed of combustion varies directly as the engine speed. Upton, on the other hand, assumes that the speed of combustion is a linear function of the engine speed but has a definite value even with the engine stationary. The latter author implies, moreover, that combustion should be three-fourths completed at dead center. These three assumptions give different relations between the required spark advance and the engine speed. Under the first, the spark advance must vary linearly with the engine speed. Under the second (Ricardo's) no change in spark advance is required with change in speed, while under the assumptions of Upton the required spark advance when plotted against engine speed gives a curve which is concave toward the engine speed axis.

The compression ratio has a very striking effect on the spark advance required, although this does not affect the design of a spark advance mechanism, because in any one engine the compression ratio does not vary. Jacklin, for instance, has shown that with a 3 by 4-in. single cylinder engine the optimum advance decreases from 45 deg. for a 5.4 ratio, to 27 deg. for a ratio of 6 and to 17.5 deg. for a ratio of 7.

To determine the effect of exhaust dilution on the optimum spark advance, some tests were run with the six-cylinder experimental engine of the Research Association. Two different camshafts were used, one giving an exhaust opening period of 217 deg. and the other of 265 deg., the inlet timing being the same for both. The optimum spark advance with the shorter exhaust-opening period was greater throughout the speed range, about 5 deg. greater at 2000 r.p.m. With another cylinder block and the same two camshafts the optimum spark advances were materially greater; with the short-exhaust-period camshaft at 1750 r.p.m. it was about 9 deg. greater than with the original cylinder block and the same camshaft. From these figures it is apparent that *a priori* design of spark advance regulators is not likely to be successful.

Turbulence reduces the need for spark-advance regulators. Ricardo, for instance, found that by increasing the turbulence the optimum spark advance can be reduced from 37 to 10 deg. Whether the consequent rapid pressure rise is a reasonable price to pay for the simplification of the ignition mechanism is a matter of opinion.

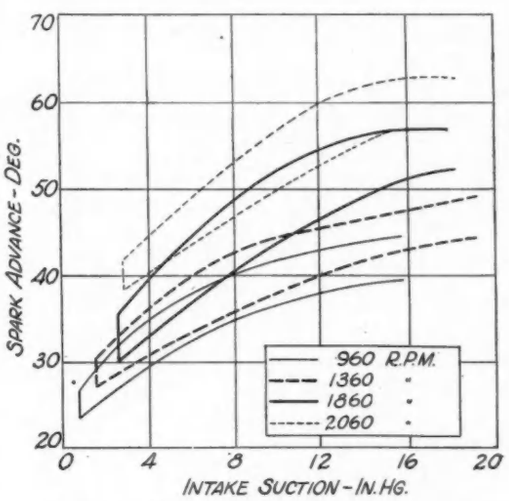


Fig. 3—Relation between optimum spark advance and inlet vacuum at different speeds

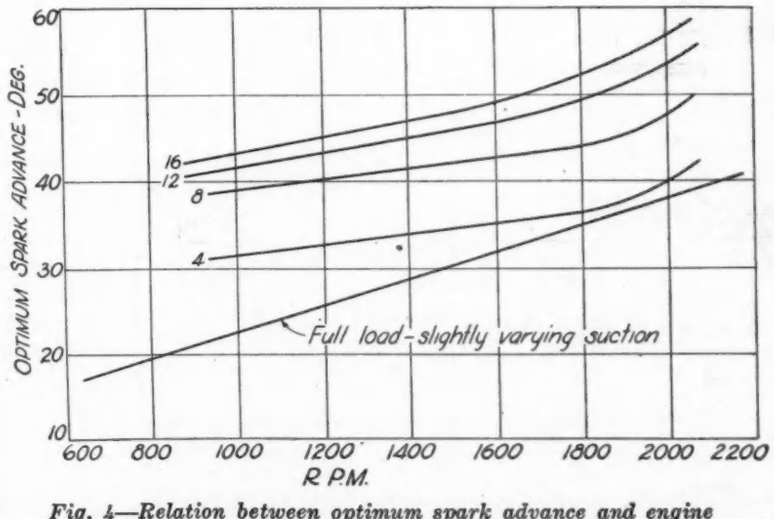


Fig. 4—Relation between optimum spark advance and engine speed for different values of the inlet vacuum in in. of mercury

The air-fuel ratio exercises a strong influence on the flame speed. Various investigations on the rate of flame propagation as affected by the air-fuel ratio have been made, and all agree that the rate is highest for a mixture ratio corresponding substantially to maximum power. Results obtained with the experimental engine with its two camshafts showed that the better scavenged engine (with the longer exhaust period) needs less advance for all air-fuel mixtures and that a greater advance is required with the maximum-economy than with the maximum-power mixture. This aspect of the subject is of particular importance in connection with the question of unequal distribution. If the different cylinders of a multi-cylinder engine receive charges of different richness and the required spark advance varies with the richness of the mixture, then it is evidently impossible to have a spark advance which is optimum for all cylinders.

If an engine is badly carbonized, hot points may be present, tending to cause self-ignition and generally accelerated combustion. Thus a manufacturer might wisely make provision for a decrease in spark advance with continued use.

The required spark advance varies also with the temperature of the charge entering the cylinders, but it is impossible to take account of this by means of the usual automatic regulating mechanism.

In any review of ignition factors, engine load cannot be omitted, but no simple answer can be given to the question as to the effect of load on spark advance required. Some experimental results are shown in Fig. 2. These curves show how greatly different the effect of load may be in different engines. It has the least effect on the Ford Model T engine, while the effect on a Continental six-cylinder engine is nearly the same. The next two curves refer to the experimental engine of the Research Association with its two camshafts respectively, the one marked (1) having the short exhaust period. Finally, the curve marked R.A. 2 cyl. refers to a double-cylinder opposed horizontal engine. These curves, in which the optimum spark advance is plotted against inlet vacuum, correspond to operation at constant speed.

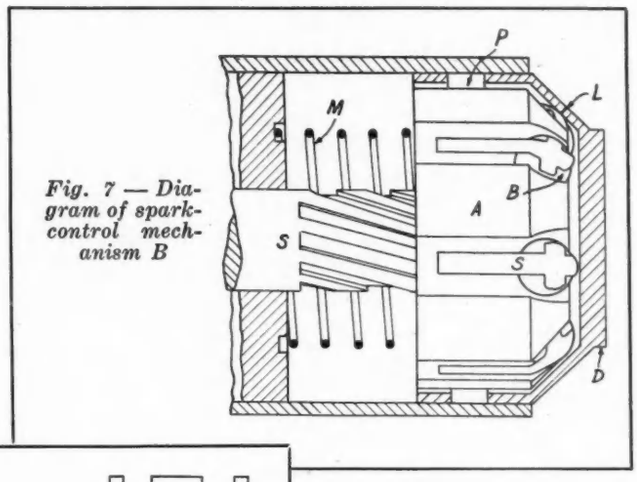


Fig. 7 — Diagram of spark-control mechanism B

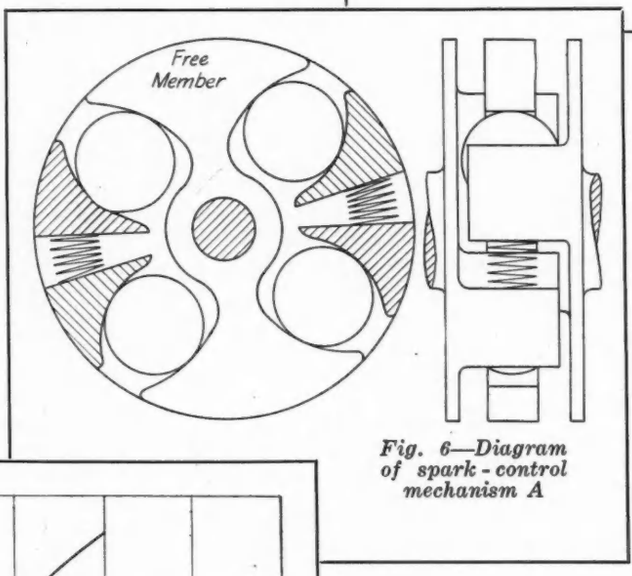


Fig. 6—Diagram of spark-control mechanism A

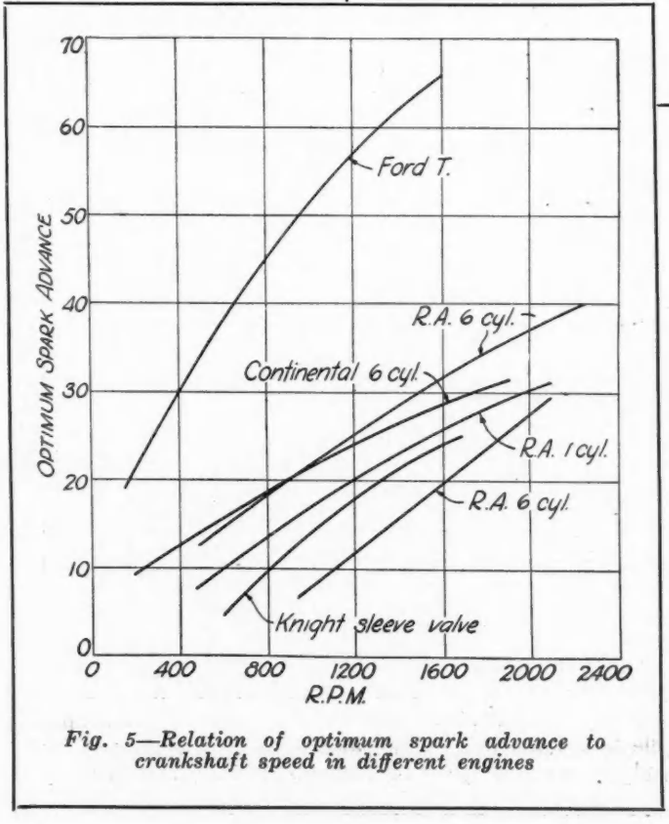


Fig. 5—Relation of optimum spark advance to crankshaft speed in different engines

From the foregoing review of the various factors affecting optimum spark advance, it will be readily appreciated that no reasonable form of mechanism may be expected to provide compensation for every variable and for every engine. Fortunately, in most engines the conditions in the neighborhood of optimum spark advance are not sensitive, so that a considerable latitude is permissible, and, on this account, not only is a simple mechanism for control practicable, but it becomes possible, with very slight adjustments, to apply one simple mechanism to several different engines.

Before fitting, or deciding to fit an automatic spark advance, it is clearly necessary to make a few experimental determinations on the engine under consideration. These should be primarily concerned with variations due to speed and load.

Perhaps the simplest way to carry out these preliminary spark-advance tests is to run an engine at full-open throttle and varying speed, and then at some constant speed with varying load. As the load varies the intake suction is measured by means of a simple U-tube mercury gage. In carrying out the test, since the maximum point is difficult to locate precisely, a "bracket" is made of two readings—one where the power shows a tendency to fall due to retardation of

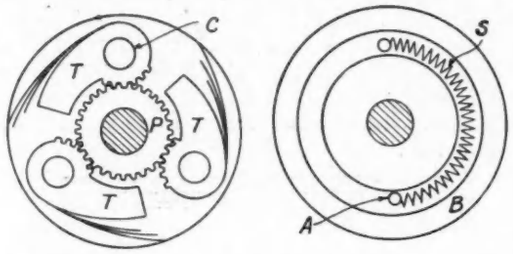


Fig. 8—Diagram of spark-control mechanism C

the spark, and the other where the power shows a tendency to fall due to advance of the spark; the mean of these two observations is capable of exact repetition, and the width of the bracket is a measure of the latitude permissible.

In this way the curves of Fig. 3 were constructed for the Research Association six-cylinder engine and the smoothness of the curves through the points is referred to as an indication of the precision of the method. Taking the median of the double curves in Fig. 3 and cross-plotting against speed, the curves in Fig. 4 were constructed. These show speed effects for various loads or suctions. Figs. 3 and 4, therefore, give the foundation on which a solution can be based.

The speed effect may be regarded as the primary factor and, obviously, the correction (spark advance) required by it will depend on the engine and may be as much as 65 deg. of crankshaft rotation. A few typical results are given in Fig. 5. The curves all relate to full-load conditions. One curve refers to the six-cylinder R.A. engine with cold inlet pipe, and another curve, much lower, to the same engine with considerable pre-heating. A permissible tolerance for the spark-advance correction for speed effect would be plus and minus 5 deg., which would insure not less than 99 per cent of full power.

As regards the suction effect, a slightly greater tolerance is usually permissible, such as plus and minus, 7.5 deg. for the Continental engine tested by Upton for the same maximum power loss (1 per cent). Suction effects may require as much as 60 deg. adjustment.

Since the speed and suction effects are additive, it is fairly easy to devise mechanism to compound the necessary adjustments, but even if this were done, there would still remain several corrections that cannot easily be made automatic. Therefore, with most engines the occasional use of hand operation seems to be indispensable.

One of these factors is temperature, which in extreme cases may require as much as 10 deg. correction in spark timing. For instance, with intense hot-spotting the spark often has to be retarded to prevent detonation. When an engine is badly carbonized the spark may have to be retarded from 5 to 10 deg. to allow for the effect of carbonization.

Fuel effects rarely would be very considerable, and if they were, as in changing to a doped fuel, it would appear preferable to make the correction by means of the magneto coupling (in England a vernier-type of rubber coupling is much used for magnetos). For the ordinary changes of fuel encountered an adjustment of 5-10 deg. would appear to be ample. Changes in carburetor setting and in distribution might call for adjustments of up to plus and minus 5 deg.

From these considerations it appears (say the authors) that a manual adjustment giving 10 deg. on each side of the range of automatic timing would be desirable and sufficient. If, however, only either speed or suction effects are corrected automatically, then the range of adjustment available should be increased by about 20 to 60 deg. of crankshaft rotation.

Five different types of spark-control mechanism are examined in the paper and are designated by the code letters *A, B, C, E* and *F*. All five mechanisms make correction in the spark setting for speed effects only.

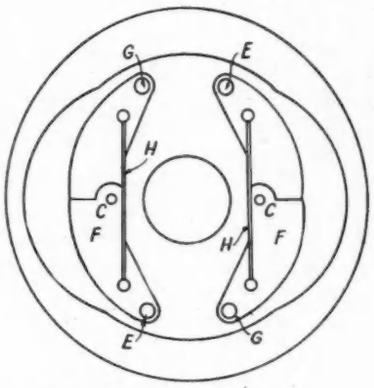


Fig. 9—Diagram of spark-control mechanism E

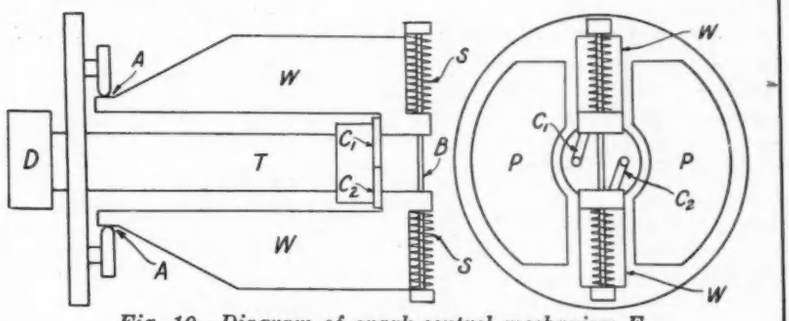


Fig. 10—Diagram of spark-control mechanism F

In mechanism *A*, Fig. 6, the driving and driven members are each fitted with two projections 180 deg. apart. Coil springs are arranged between the flat surfaces of these projections, and so control the relative movement of the two members. The weights are in the form of four steel balls, of 0.8 in. diameter, which press against the curved sides of the projections and against similar curved surfaces on a member which is free to rotate on the central spindle. Thus, the action of the centrifugal force on the balls forces the projections together and, since the direction of rotation is that shown by the arrow, the driven member, and hence the armature, is advanced relative to the driveshaft. There is no manual adjustment on this magneto.

The mechanism of design *B*, Fig. 7, consists of a light aluminum cage *A* containing seven balls *B*, each ball being held by a short leaf spring *S* in its groove in the cage. The cage is able to slide longitudinally relative to the driving member *D*, but is prevented from rotating relative to *D* by means of projections *P* which engage corresponding slots in the member *D*. The spindle *S* and the hub of the cage are provided with helical splines so that when the cage move longitudinally the splined spindle *S*, which carries the armature, is rotated relative to *D*. This longitudinal movement is obtained

by means of the reaction of the balls *B*, when under the action of centrifugal force, upon the inclined or conical surface *L* of the member *D*. The coil spring *M* insures that the balls are always in contact with the surface *L*, and also supplies additional elastic control of the mechanism. The range of the supplementary manual control is 30 deg.

In mechanism *C*, Fig. 8, the flyweights are in the form of three toothed sectors *T*, which are pivoted to the driven member and are controlled by leaf springs, each spring comprising three separate leaves. The drive is transmitted through the central pinion *P*, which is attached directly to the Simms coupling and hence by means of the toothed sectors to the driven member. When under the action of centrifugal force, the sectors rotate about their pivots and, owing to the engagement of the sectors with the central pinion, the driven member is forced to rotate in a clockwise direction relative to the pinion *P*, so that the ignition is advanced. The illustration also shows the arrangement for varying the retaining force on the sectors when in the initial position. One end *A* of the coil spring *S* is attached to the driving member *B*, while a pin attached to the other end is inserted in a corresponding hole in the pivot of the sector *C*. The initial tension on the spring can be varied by inserting the pin and by rotating the member *B* the requisite amount before sliding the pinion *P* into engagement with the toothed sectors. The range of the supplementary manual control is 30 deg.

In device *E*, Fig. 9, the flyweights *F* are pivoted at *E* to the driven member, while pins on the driving member (not shown) engage holes *G* at the other ends of the weights. Each flyweight is articulated at its center *C*, and elastic control is provided by leaf springs *H*, held at each end in slots in the weights. It is clear that if the driving pins *G* be considered as fixed, the effect of centrifugal force is to deflect each weight at its center and at the same time to rotate the line joining the pins *E* in a clockwise direction so that the driven member is advanced relative to the driving member. The range of the supplementary manual control is 30 deg.

Mechanism *F*, Fig. 10, differs from the other five tested in certain fundamental respects. The magneto is of the rotating-magnet type with stationary primary and secondary windings, and the advance mechanism operates by altering the phase of the contact-breaker cam *D* in relation to the rotating magnet. Thus, the phase of the rotor relative to the driveshaft is unaltered and the mechanism is unaffected by the drive torque. The two brass weights *W* are arranged between the poles *P* of the magnet and are pivoted at one end *A*, and subjected to the elastic constraint of coil springs *S* at the other. The springs are held in position by means of the bolt *B* passing axially through the springs. Two links, C_1 and C_2, like small connecting rods, connect the weights *W* to two eccentric pins serving as cranks on the shaft *T*. Thus, when the weights move outward under the action of centrifugal force, the cranks rotate the shaft *T* which carries the contact-breaker cam *D* at its end. No manual adjustment is provided.

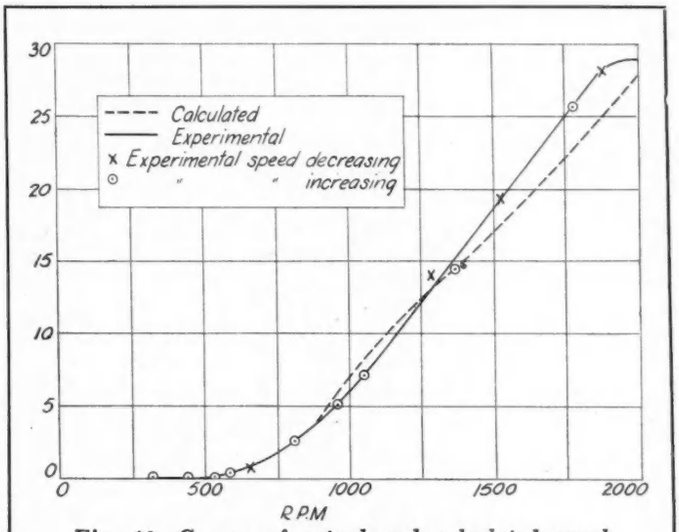


Fig. 13—Curves of actual and calculated spark advance with mechanism C

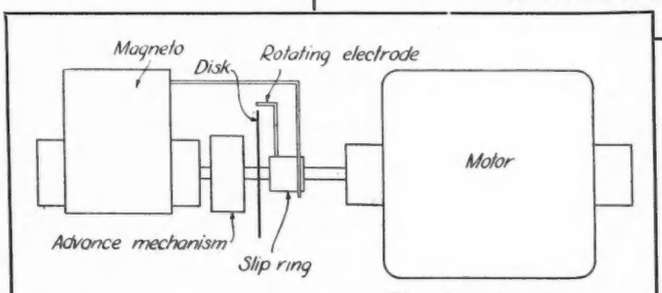


Fig. 11—Apparatus for measuring spark advance

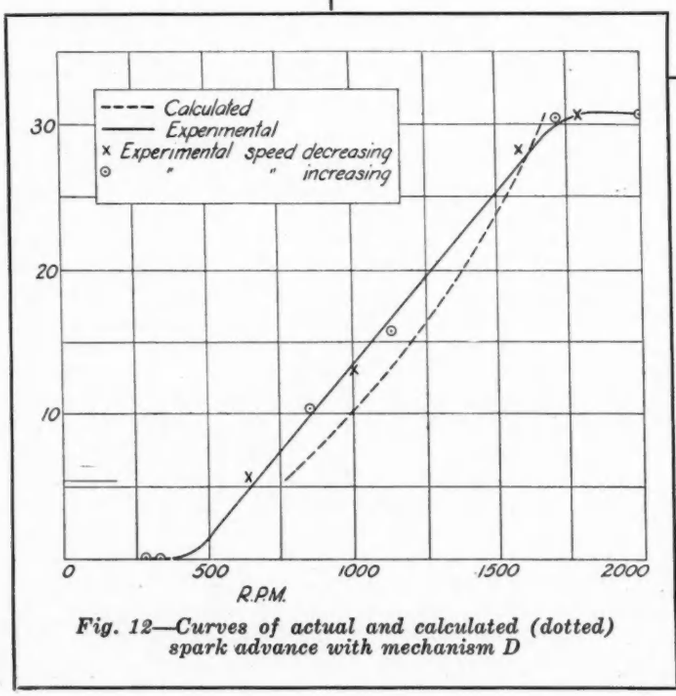


Fig. 12—Curves of actual and calculated (dotted) spark advance with mechanism D

In all of the mechanisms examined the centrifugal effect and the elastic control depend on the angular displacement constituting the adjustment, and the elastic torque was therefore measured over the range of movement permitted. At first comparatively large hysteresis loops were obtained when making these tests, due to the considerable friction in the mechanisms, but these were largely reduced by vibrating the mechanisms by gentle hammer blows. (This light hammering is evidently considered to have an effect similar to that of

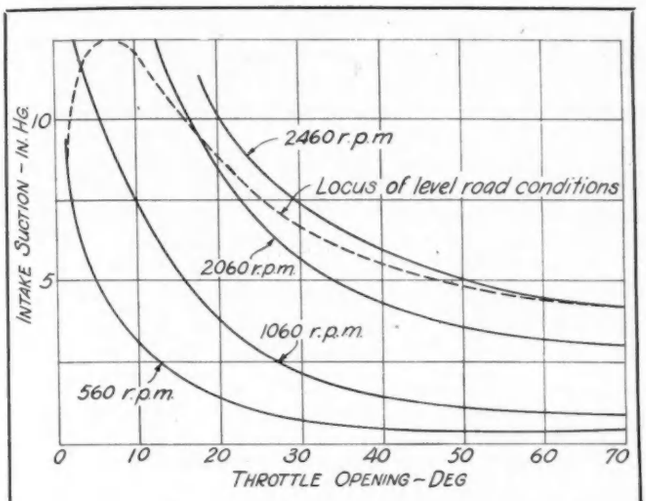


Fig. 14—Chart showing variation of intake vacuum with throttle opening at four different speeds for six-cylinder 158 cu. in. engine

vibration on a car in motion.) The mean rates of the springs of four of the devices are given (in lb.-in. per deg. of advance) in the following table:

Mechanism	*A*	*C*	*E*	*F*
Lb.-in. per deg.	0.33	1.00	0.55	0.125

This shows a wide variation in "rates," the strongest and weakest bearing a ratio of 1 to 8 to each other.

The driving torques of the different magnetos equipped with the spark control mechanisms described, at different speeds, are given in the table below:

TABLE 1

DRIVING TORQUE, LB.IN.

	Speed R.P.M.			
Magneto	500	1,000	1,500	2,000
A	1.85	1.85	1.87	1.87
B	2.35	2.62	2.88	3.05
C	2.15	2.45	2.70	2.84
E	1.72	2.05	2.15	2.20
F	1.25	1.32	1.40	1.50

From the dimensions of the centrifugal mechanism, together with the driving torque and the elastic control torque (spring rate) it is possible, at least theoretically, to determine the spark advance at various speeds. This was done for two of the mechanisms. The actual advance curves for all the mechanisms were determined experimentally by means of the following equipment (Fig. 11): The driving element of each magneto was fitted with a sparking point which was connected by a slip-ring arrangement with the high potential side of the secondary circuit. The spark between the grounded rotor and the rotating point was displaced as the speed varied. One of the electrodes of the gap in Fig. 11 is in effect a point rotating with crankshaft phase, on the advance mechanism, while the other electrode is a disk on which the position of the spark, with crankshaft phase, can be observed. The spark curves for the two mechanisms for which the theoretical curves were calculated are reproduced in Figs. 12 and 13. The main numerical values of the characteristics of the different mechanisms are given in Table I. With most of the mechanisms considerable speed is required before motion takes place, the speed where motion begins being particularly high in the case of magnetos requiring the greatest driving torque. In the characteristic curves experimental points are marked by *X* and *O*, the crosses marking points obtained on a decrease in speed and the *Os* on an increase in speed.

The authors also show the effect on fuel economy of ignoring the effect of load on required spark advance. They show that for an engine running at 1360 r.p.m., if the spark advance is controlled by speed alone, the fuel consumption will average about 20 per cent higher, and will reach a maximum of 40 per cent higher than when load effects are also taken into account. It therefore would seem advisable to control the spark timing by the inlet suction which is directly dependent on the load on the engine. If the suction effect where used to displace a coupling with helical splines, the optimum armature position could be preserved for various degrees of spark advance, as is highly desirable. However, there are a number of objections to control by the intake vacuum, as follows:

1. Leakage, increasing with wear, may upset the calibration.

2. For operation in mountainous country, where the atmospheric pressure is sub-normal, spring or other adjustments would be necessary.

3. Unless the suction piston and the control springs were both comparatively large, considerable errors would occur due to friction in the mechanism.

(Please turn to page 204)

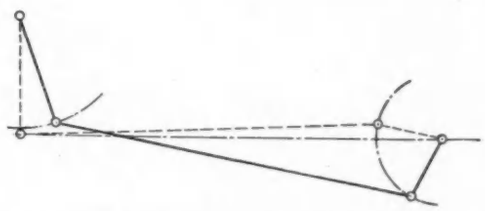


Fig. 16—Linkage between throttle and cam-cage lever for "throttle control" of spark advance

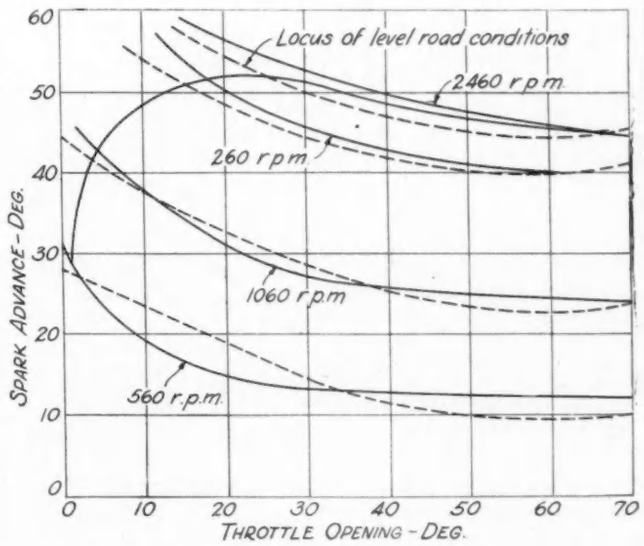
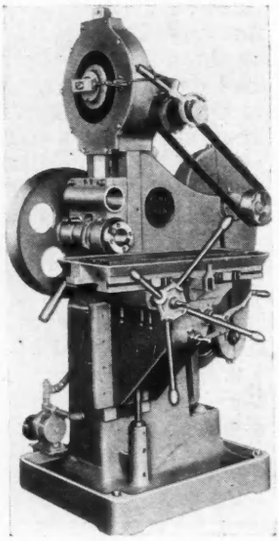


Fig. 15—Chart showing required spark advance in relation to throttle opening for four different speeds, and (in dotted lines) spark advances obtained with linkage illustrated in Fig. 16

NEW DEVELOPMENTS—Automotive

Cam Feed Miller

KENT-OWENS MACHINE CO. has recently placed on the market a new milling machine with cam feed to the head, especially designed for high production jobs. The cam feed, which permits the use of a rate of travel to suit changes in cross-section of the cut, may be operated either continuously or may be automatically disengaged upon the completion of a cycle. In the former case the cutter passes through its cycle continuously, the operator simply loading and unloading the work, in which case, of course, an indexing fixture can be used advantageously on many jobs.



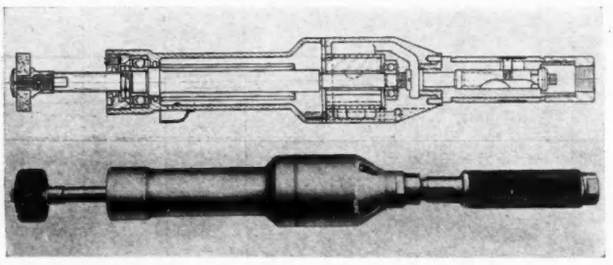
Kent-Owens cam feed miller

A drive from the motor which is mounted on the back of the column shown in the accompanying illustration, is by silent chain to the backshaft, both the vertical feeding arrangement and the spindle drive being by belts from this backshaft. The latter, as well as the spindle, are mounted on Timken taper roller bearings. Cam drive is through a hardened steel worm and bronze worm wheel with an eccentric bushing provided to take up for wear. Both cam and follower are of hardened steel.

A heavy flywheel type spindle is provided to prevent chatter and vibration. The machine may be arranged for either countershaft or motor drive.

Rotor Die Grinder

THE Rotor Air Tool Co. of Cleveland, Ohio, announces a new die grinder for 1½-in. vitrified wheels, 2½-in. high-speed wheels and ½-in. pencils.



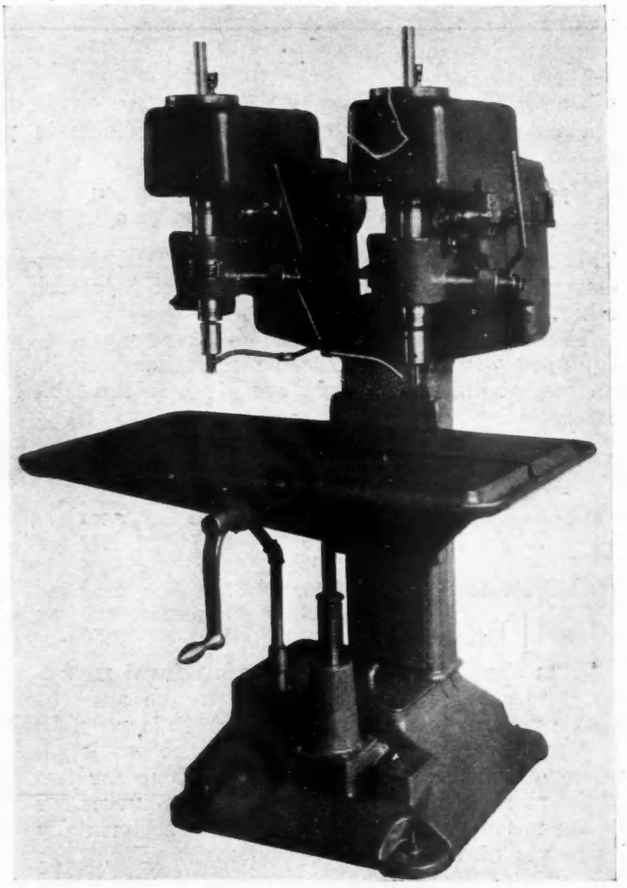
Rotor die grinder in section and outside view

The tool is designed for use on dies, metal patterns and in brass, bronze and aluminum foundries for finish-grinding on castings and for scroll work on ornamental pieces. It is claimed that the tool develops more than ½ hp. at 13,000 r.p.m., this high speed being necessary for smooth, clean work with small wheels and points.

The cross-section shows the simple design of the new tool, which weighs only 4 lb. The standard equipment includes a wheel arbor for wheels with ⅜-in. hole and ⅜-in. wide, but arbors for ¼-in. and ½-in. holes can be furnished on special order. A full line of accessories is offered with the grinder.

Automatic Tapping Machine

THE friction-driven and geared semi-automatic tapping machine herewith illustrated is a new product of the Rickert-Shafer Co., Erie, Pa. It can be furnished either with a single spindle or with multiple spindles.



Rickert-Shafer automatic tapping machine

For driving the spindles, use is made of a multiple-disk friction clutch, which tends to prevent breakage. For production on an automatic basis use is made of a block on a serrated cam located on the left side of the spindle housing, which is set to allow the tap to travel to the proper depth. A downward pull on the handle engages the clutch, so that the spindle and tap are driven into the work. When the required depth is reached the block trips the mechanism, so that the clutch is released in one direction and is immediately thrown in in the reverse direction, setting in operation a train of gears which reverse the spindle, and back the tap out of the

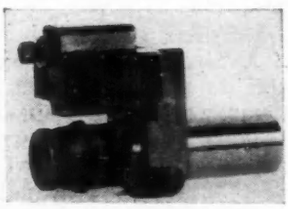
Parts, Accessories and Production Tools

work. A small upward thrust on the handle then reverses the mechanism and it is ready for the next piece.

For ordinary production tapping one operator can keep two spindles going full time. These machines are furnished with a pump and equipment for supplying a generous flow of coolant or oil to the taps. Overflow is returned to the reservoir in the base. Machines can be furnished for either belt or motor drive.

B & S Releasing Die Holder

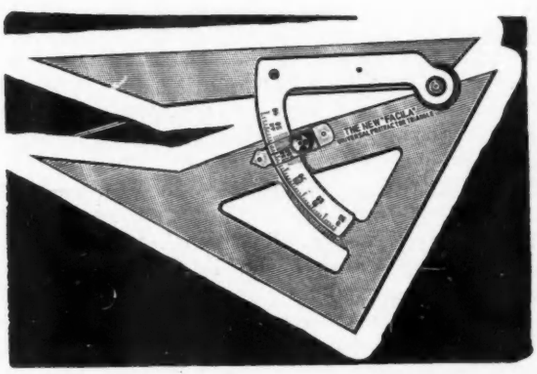
THE releasing die holder illustrated herewith is made by the Brown & Sharpe Manufacturing Co. of Providence, R. I., for use with Acorn dies on the Brown & Sharpe automatic screw machines. This holder is specially adapted for use where the thread must be held to a definite length, as when threading close to a shoulder. An adjustable screw on the front of the holder comes in contact with the chuck guard over the nose of the spindle and thus governs the length of threading.



Brown & Sharpe No. OOG releasing die holder

Facila Triangle

A NEW tool, which facilitates the work of the draftsman, has been placed on the market by E. S. Brown, 247 West Genesee St., Auburn, N. Y. It is known as the new Facila universal adjustable protractor triangle and comprises a transparent celluloid body 0.08 in. thick, with self-centered, ivory-grained celluloid protractor of large size, all parts being firmly secured by rivets or screws. A nickel-plated knob, which locks the protractor in any position, also serves to pick up the instrument by and handle it. The annular interlocking hinge is said to have a relatively large bearing surface, which tends toward smooth action and long life.



Facila universal protractor triangle

The protractor is engine-divided with large half-degree divisions, which facilitates setting. A unique feature of the instrument is the swinging right angle, which eliminates the necessity for resetting for complementary angles and vertical lines.

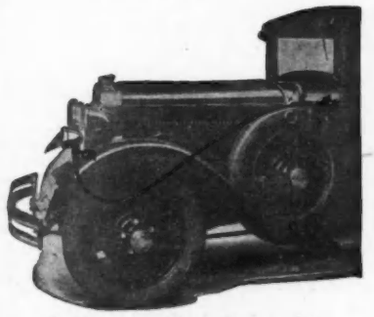
Welded Camshafts

A NEW method of manufacturing camshafts has been developed in the research laboratories of the General Electric Co. and will be exploited commercially by the Alamo Corp. of Hillsdale, Mich. The shaft and the cams are made separately and united by brazing. This permits of the use of a length of seamless steel tubing for the shaft, which has advantages where it is desired to supply lubricant to the camshaft bearings through a hollow shaft, as it dispenses with the need for gun-drilling the shaft; also in cases where it is desired to use a hollow shaft for the sake of lightness, as in aircraft engines.

The joint between the cams and the tube is made by brazing in a furnace in a hydrogen atmosphere, using copper for the brazing agent. We understand that quite a number of camshafts have been built up in this way and are now in service in experimental engines. The Alamo Corp. plans to furnish engine manufacturers camshafts ready for finish-machining, hardening, straightening and finish-grinding. In some cases, where large volumes are involved, the concern plans to finish the camshafts complete. It is claimed that the shaft can be produced well within the cost limit of a camshaft made from a drop forging. One of the advantages claimed for this method of production is that materials most suitable for the particular purpose can be used for the cams, bearings and gear.

Eaton-Lite

THE Eaton-Lite, a driving light of new principle, is close to the ground in front of the radiator and gives a broad, penetrating beam of light that does not disturb the approaching motorist. Also, due to its position, there is no annoying reflecting glare from polished parts on the driver's car. It is dash controlled. A flexible cable connects with a knob on the instrument panel, which turns the light up or down, left or right. No drilling or disfigurement to any part of the body is necessary. The reflector is silver-plated and scientifically designed to obtain maximum brilliance. The control shaft is similar in construction to a speedometer cable.



Dash-controlled Eaton-Lite

The Eaton-Lite is easily installed on any make of car. Attaching brackets are universal, and only four different lengths of flexible cable are required to fit all chassis.

It is manufactured by the Eaton Bumper & Spring Service Co., Cleveland, Ohio.

Piston Ring Expander

A NEW type of piston ring expander designed to prevent piston slap in high speed, high compression engines, has been placed on the market by the Simplex Piston Ring Co. of America., Cleveland, Ohio. The Simplex Slap-Chek expander, as the device is called, is made of alloy steel of variable thickness. Dowel pins are provided which hold the expanders in place relative to the piston. These are located in shallow holes drilled in the bottom of the piston ring groove by means of a Simplex drill jig.

Simplex piston ring expander

The expander, when installed, bears against the bottom of the ring groove at a number of points, but the pressure is non-uniformly distributed around the piston and the latter is held against the front wall of the cylinder. The piston, it is explained by the manufacturer, may be considered as held in a trough formed by the front half of the cylinder bore, which effectively prevents piston slap. With this expander the supply of oil to the cylinder wall is the same as with the regular Simplex piston ring, the manufacture of which is being continued.

"New Kathode" Electrode

THE Lincoln Electric Co., Cleveland, Ohio, are offering to the trade the "New Kathode" welding electrode. The electrode is manufactured for the arc welding of mild steel and for cast iron repair work.

The composition of the "New Kathode" welding electrode, as well as the special treatment given in its manufacture, imparts qualities heretofore lacking in the usual electrode. Flowing easily with freedom from sputtering, the new electrode produces clean welds with minimum slag and oxidation. The high heat permissible for use with this fast-running electrode makes possible increased welding speed.

The "New Kathode" electrode is manufactured in stock lengths of 14 in. and 24 in. To provide best possible protection, during shipment, the rod is packed in metal containers holding 50 lb. each.

Ball Bearings for Aircraft

A SERIES of ball bearings particulary adapted for airplane control mechanisms has been made available to plane manufacturers by The Fafnir Bearing Company, New Britain, Conn.

These bearings, known as the S Series, are of the single row radial type, with inch dimensions and narrow widths. They are available in bores from ¼ to 1 in. as follows:

Bearing No.	Bore In.	Outside Dia. In.	Width In.
S1	¼	¾	7/32
S3	⅜	⅞	7/32
S5	½	1⅛	¼
S7	⅞	1⅜	9/32
S8	¾	1⅝	5/16
S9	⅞	1⅞	⅜
S10	1	2	⅜

We are informed that the Fafnir Bearing Company has recently organized an aeronautical division and is making an exhaustive study of the bearing requirements of the aircraft industry.

Spark Governor Controlled by Engine Load

(Continued from page 201)

4. Already a good many devices are operated from the inlet manifold and it is inadvisable to load it further.

With these disabilities of suction control in mind, the possibility of combining "speed control" with "throttle control" was investigated. Unfortunately, except at any particular speed, throttle position is not definitely connected to engine load. But if some approximate relation could be established between throttle position and load, it would appear feasible to use this as an adjunct to speed control.

In Fig. 14 are shown four curves connecting manifold suction with throttle position. These curves relate to 560, 1060, 2060 and 2400 revolutions per minute respectively. The results were derived from experiments on the six-cylinder engine already mentioned. Throttle angles are measured from the closed position, and a boundary locus of level-road conditions is indicated.

Utilizing the results in Fig. 2, which gives spark advance against suction, the curves in Fig. 15 were constructed showing for the four given speeds the required spark advance against a basis of throttle position. The practical application of these results consists, therefore, in devising a mechanism which would interpret the curves in Fig. 15 into actual throttle motion and spark advance. Obviously, such a mechanism can be devised; the only considerations of importance are the cost of construction and the accuracy of translation required. With suitable cams or pulleys, very considerable accuracy should be attainable, and with very cheap, simple linkages sufficient precision for all practical purposes can be obtained. As an example, merely for purposes of illustration, the linkage in Fig. 16 may be noticed. This is only a hasty improvisation, but from the dotted curves in Fig. 15, which indicates the spark advance produced through this linkage by the throttle movement, it appears that a very good approximation, well within the permissible tolerances laid down and, therefore, sufficient for practical purposes, can be easily produced by throttle control. In Fig. 15 a locus of level-road conditions accentuates the virtual accuracy of the approximation.

If this throttle control is attached to the cam-cage arm, as at present is usual with hand adjustment, there is no difficulty in adding a third or manual adjustment. This might take a variety of forms; a simple arrangement would be a floating lever breaking the link in Fig. 16 or, alternately, a right-and-left-hand threaded turnbuckle to adjust the length of the link. With such a combination of speed and throttle control the manual adjustment would be only rarely required, and then the adjustment would be comparatively small, unless large changes in fuel or climate had to be compensated for.

Books for the Business Bookshelf

A History of Mechanical Invention

By Abbott Payson Usher, McGraw-Hill Book Co., Inc., New York. 401 pp. Illus. $5.

TO anyone interested in mechanical contrivances, this should be a very interesting book. It discusses briefly and fairly comprehensively the history of all sorts of mechanical devices, most of the inventions being illustrated. Following several chapters devoted to mechanical inventions during certain periods of history the book discusses the development of wire wheels, windmills, of clocks, the invention of printing, textile machinery, production and application of power and machine tool quantity production.

Aircraft Float Design

Holden C. Richardson, 111 pages, The Ronald Press Co., New York. Illus. $5.

THIS is one of the Ronald aeronautic series and is designed to present complete information on aircraft floats for student engineers and designers.

Marketing Investigations

By William J. Reilly. The Ronald Press Co., New York. 245 pp. $5.

THIS is another book written definitely for the use of practical marketing executives and attempts to provide definite information about methods of conducting investigations in the field, testing the adequacy of a sample of information and measuring the accuracy of market data. The plan of the book conforms to the four main steps followed in conducting a marketing investigation, namely, preparing for the study of a specific problem, gathering the information in the field, in preparing the market information and presenting the market data.

Scientific Sales Management Today

By Charles W. Hoyt, The Ronald Press Co., New York. 253 pp. $4.

THE author of this book, who died a few months ago, was one of the outstanding leaders in the development of modern merchandising methods, and the book contains, to a very large extent, reflections of his personal experience, extending back over nearly 30 years of sales and advertising work. Not only is sales theory discussed in the book, but there is also included a great deal of information regarding practical sales methods in the organization and administration of sales departments.

The Engineering Index 1928

Two Volumes. The American Society of Mechanical Engineers, New York. $125.

THE new edition of a well-known book is an encyclopedic bibliography of periodical engineering literature published during 1928. Over 75,000 reference items on 5000 subjects have been taken from 1700 engineering periodicals of the world. The two volumes contain approximately 2000 pages and cover every phase of engineering activities. The purpose followed in compiling this index is to present the material in such a form as to enable the user to locate quickly all published data on any given subject and to describe adequately each article indexed so that the reader may determine its probable value for his purpose.

Planned Marketing

By Virgil D. Reed. The Ronald Press Co., New York. 346 pp. $5.

THIS book is intended to serve as a practical guide in planning the marketing of manufactured goods and the author discusses, step by step, each move in the complete marketing plan. In the first part of the book a number of actual cases under fictitious names are presented with analysis of their weakness. Following this there are sections devoted to various phases of establishing the marketing plan. These include, first, preparing the marketing plan, then the market survey, including the foundation of the marketing plan, the advertising plan, and keeping the plan fresh. Considerable ground is covered in the book so that no attempt has been made to treat each item exhaustively, but rather to present a comprehensive picture of the fundamentals of effective planning practically applied. The book is intended primarily for the practical use of marketing executives.

Industrial Standardization

National Industrial Conference Board, Inc., New York. 306 pp. $3.50

THIS book is the result of a survey made by the National Industrial Conference Board to provide a clear and comprehensive exposition of the industrial standardization movement. In addition to presenting a simple statement of the nature and meaning of standardization, the book presents a concise description of the working structure of the industrial standardization movement, as expressed in the work of individual concerns, engineering societies, trade associations, etc., and attempts to examine the authenticity of the numerous economic advantages claimed for standardization by its proponents. Like all of the board reports, the subject is covered in a very thorough manner and should be of considerable interest to manufacturing executives.

Publications Recently Issued

By the National Advisory Committee for Aeronautics, Washington, D. C.

Technical Note No. 305, Corrosion Embrittlement of Duralumin. VI—The Effects of Corrosion Accompanied by Stress on the Tensile Properties of Sheet Duralumin, by Henry S. Rawdon.

Technical Note No. 306, Curves Showing Column Strength of Steel and Duralumin Tubing, by Orrin E. Ross.

Technical Memorandum No. 515, Materials and Methods of Construction in Light Structures, by Adolf Rohrbach.

Report No. 309, Standardization Tests on N. P. L. R. A. F. 15 Airfoil Model, by Walter S. Diehl.

First with the News

Reliable, Accurate

News of the Industry

PAGE 206 VOLUME 61 *Philadelphia, Saturday, August 10, 1929* NUMBER 6

August Schedules Expected to Top Those of Year Ago

PHILADELPHIA, Aug. 10—The automobile industry has entered the second week in August with production at a rate which promises to show a total for the month well above that of August last year, when the factories in the United States and Canada turned out 492,543 cars and trucks. Several companies, which either have announced new models or are about to make such announcements, are resuming or contemplating comparatively high production schedules.

New car registrations in Detroit during the last few days in July spurted suddenly forward with the result that the total for the month was brought to a figure well above that of July last year despite less favorable outlook earlier in the month.

Sales executives report that the demand in the field continues favorable.

Although still quite heavy, new and used car stocks are declining, dealers report. Car stocks reached their peak in April, and have been showing a continued sharp decline since.

Production figures for July, estimated by the National Automobile Chamber of Commerce, were 327,650, a reduction of 12 per cent over July, 1928. For the first seven-month period of this year production was estimated at 2,656,106, an increase of seven per cent over the same period last year. The July figure for the entire industry, according to the estimate, will be over 500,000, as against 417,312 of July, 1928.

(Detailed reports from the factories on July production appear on page 207.)

Mercer Control Bought By Wahl and Associates

Harry M. Wahl, who was identified with the early years of Chevrolet and other large factors in the automotive world, has with a group of associates acquired control of Mercer interests and sponsors the new Mercer, according to an announcement by C. P. Huntington, representing the group.

Mercer motor cars were formerly built in Trenton, N. J. Mr. Wahl was unwilling to state, however, where the new Mercer was to be produced. He said that Mercer, possibly in association with other builders of high grade cars, will be ready in 1930 with a product worthy of the name.

Plane Rental Agency Buys 100 Airplanes

KANSAS CITY, Aug. 7—The formation of the Saunders Fly-It-Yourself Company, which has ordered 100 two-seater sport planes to be rented to licensed pilots who find it too expensive to own their planes, is announced. It is an outgrowth of a drive-it-yourself company, operating motor-car rental agencies in sixty-five cities.

The rental charge, it was indicated, would be $15 to $20 an hour.

Raskob Buys Interest in Aero Supply Mfg. Co., Inc.

NEW YORK, Aug. 6—John J. Raskob, formerly chairman of the finance committee of General Motors Corp., has acquired a substantial block of stock in the Aero Supply Mfg. Co., Inc. Mr. Raskob's holdings, together with those of banking interests, are said to represent a majority holding in the company.

The Aero Supply Mfg. Co. together with its subsidiaries, Standard Automatic Products Corp. and National Steel Products Co., manufacture over 3000 different parts used in aircraft construction.

Higbee Body Purchases Hicks Company

KOKOMO, IND., Aug. 5—The Higbee Body Co., manufacturer of wagon and motor truck bodies for forty-five years at Sheridan, near here, has completed negotiations to purchase the Hicks Body Co., plant at Kokomo.

Townsend Heads New Brake Lining Firm

Sumner Simpson Chosen President of Merger of Companies

NEW YORK, Aug. 5—Raybestos-Manhattan, Inc., recently organized as a New Jersey corporation to complete the merger of the Raybestos Co. of Bridgeport, The Manhattan Rubber Mfg. Co. of Passaic and the United States Asbestos Co. of Philadelphia, has elected the following officers:

A. F. Townsend, president of Manhattan Rubber Co., chairman of the board of the new company; Sumner Simpson, president of the Raybestos Co., president of the new company; H. M. Green, vice-president of the Manhattan Rubber Co., George R. Weber and S. R. Zimmerman, both of the United States Asbestos Co., vice-presidents of the new company; F. L. Curtis, vice-president of the Manhattan company, is treasurer of the new company; W. H. Dunn, assistant treasurer and comptroller, and M. F. Judd, of the Raybestos company, is secretary.

Headquarters and main offices of the new company will be at 61 Willett St., Passaic, N. J.

The following comprise the board of directors: A. F. Townsend, F. L. Curtis, H. M. Green, Sumner Simpson, M. F. Judd, George R. Weber, S. R. Zimmerman, Mat. Barkley of the Cameron & Barkley Co., George Simpson of The Raybestos Co., Earl C. Hines of Equitable Trust Co., Clifford Hemphill of Hemphill, Noyes & Co., and Robert Atkins of Hayden Stone & Co.

Goodrich Reports Net Gain

AKRON, Aug. 8—The B. F. Goodrich Company reports for the six months ended June 30 a net profit of $5,070,000 after depreciation, interest and other charges, equivalent, after preferred dividends, to $4.59 a share on the average common shares outstanding, as compared with a net loss of $1,574,889 in the same period in 1928.

Germans to Study Production Here

BERLIN, Aug. 3—Forty foremen of the Opel works have left for Detroit where they will study American production methods in the General Motors Corp. plants there.

Industry is Shown in First Position

Production Up 28 Per Cent, Says Department of Commerce

WASHINGTON, Aug. 8—Registering an increase of 28 per cent over 1927, automobile production showed the greatest relative gain of the 12 groups of manufacturing industries last year, according to the Commerce Yearbook, made public by the Department of Commerce this week.

"The business of the United States in 1928 was on the highest level ever attained, continuing the prosperity characteristic of every year since 1921 and reflecting the steadily increasing efficiency of both industry and trade," the Yearbook states.

"Of the 12 groups of manufacturing industries distinguished, 9 showed increases as compared with 1927," it is pointed out. "The greatest relative gains were in the iron and steel, automotive, rubber tire, and petroleum refining groups."

The increase in automobile production is given as 28 per cent; rubber tires, 21 per cent; gasoline, 14 per cent; and steel ingots, 15 per cent.

"The marked increase in the efficiency of the industry, reflected in a gain since 1919 of one-third in output per worker in factories and mines and on farms and railways," it was stated, "has made it possible to set free workers for those other activities which contribute to still higher living standards."

It was estimated that larger earnings were made by workers in factories in 1928 than in 1927.

"Money wages have increased much more, as compared with pre-war figures, than the cost of living," it is declared, "and in 1919 the cost of living was materially higher than now."

Pierce-Arrow Offering Two New "De Luxe" Cars

BUFFALO, Aug. 3—Two new special types of sedans were announced today by Pierce-Arrow Motor Car Co., as an addition to the line of Straight Eights which has tripled the demand for Pierce-Arrow this year. "In creating these special cars, we felt that something unusual was due the thousands of people who, during the first six months of this year, were unable to obtain delivery of our new Straight Eight," George E. Willis, vice-president in charge of sales, said. The prices of the De Luxe models range from $3,350 to $3,590 at Buffalo, depending upon style and equipment.

Chile Buys 8 U. S. Planes

WASHINGTON, Aug. 8—The Chilean government has purchased eight American planes for air mail service between Santiago and Arica, it was announced here this week by the Department of Commerce.

Reports from the Factories for July

Among the makes of cars on which July production reports were not received as this issue of *Automotive Industries* went to press are: Ford, Durant, Oakland, Peerless, Pierce-Arrow, Studebaker and Gardner.

Buick Motor Car Co. announces that it has produced 19,807 Buick cars during July, and 5888 Marquette cars, making a total for the month of 25,695 units. The August schedule was not announced.

Cadillac, LaSalle and Fleetwood shipments for the fiscal year ending July 31 were 40,965, an increase of 11.2 per cent over those for the similar period of the previous fiscal year, Lawrence P. Fisher, president of the Cadillac Motor Car Co., announced. July retail deliveries exceeded those for July, 1928, by 10 per cent. "Business volume is continuing at high seasonable levels in virtually every part of the country," Mr. Fisher said. "The slight normal decline during the summer season will be more than made up when fall buying begins. We consider our July record unusually good in view of the fact that the Cadillac-LaSalle plants were closed down a considerable part of the month for vacation and inventory. All factories have now resumed full operation on a larger scale than during the last year." Mr. Fisher reports that the public paid more than $125,000,000 during the fiscal year for products of Cadillac manufacture, which is a new high record.

Chrysler Corp. aggregated 27,171 units in July, in spite of shutdowns in several of its plants, bringing the total for the seven-month period up to 306,806. Of the July production, Dodge Bros. division accounted for 10,652 units; Plymouth for the two weeks of its production, 4645 units; De Soto, 3170; Chrysler, 4772; Dodge trucks, 3258, and Fargo, 674. Totals for seven months production to date for the various units follow: Dodge, 92,758, including 3618 Seniors; Plymouth, 74,667; De Soto, 48,440; Chrysler, 56,591; Dodge truck, 26,566; Fargo, 4166. The largest increases for the year are recorded in the Dodge six line with an increase of almost 40,000 over the corresponding 1928 period and the Plymouth line with an increase of approximately 20,000 for the seven months as compared with the first seven months of last year.

Hudson Motor Car Co. reports the production of 7238 Hudson cars and 16,469 Essex cars in July, bringing the total shipments for the first seven months of the year to 250,019 cars, as compared with 183,047 for the same period last year, which was the best previous year in the history of the company. This is an increase of 36.6 per cent.

Hupp Motor Car Co. produced 2494 cars last month, according to an announcement by Rufus S. Cole, first vice-president in charge of sales. Production at Cleveland has been started by the company, it was announced.

Auburn Automobile Co. showed an increase of nearly 100 per cent over same month for 1928, when shipments totaled 2039 cars in July, N. E. McDarby, director of sales, announced. Sales for July, 1928, were 1034 and the total sale of Auburn for first seven months of 1929 were 16,681, as compared with 9125 cars for first seven months of 1928, while the industry as a whole showed increases of approximately 30 per cent in registrations for first six months of 1929 over same period for 1928. Auburn shipments showed increase of 81.3 per cent, Mr. McDarby pointed out. Auburn's dealer organization also showed substantial gain for the first six months of 1929 with an increase of 23.4 per cent. Not only in numbers, however, did Auburn dealer organization gain. The average cars per dealer handled showed an increase of 47 per cent for the period. The production schedule for August calls for 2025 Auburn cars.

Auburn is in production on Cord Front Drive cars, and is making shipments to dealers so they will have them on hand to show when the proposed announcement is made about the middle of the month. The production schedule on Cord for August calls for between 1000 and 1200 cars.

Franklin Automobile Co. shipped 1325 units in July, which is 53 per cent greater than last July, when the largest previous July shipping record was established. Shipments for the first seven months amounted to 10,050 units, reaching within 516 units of equaling the best previous 12 months' record. Customers' orders constitute a significant factor in the situation by keeping abreast of deliveries, thereby maintaining a satisfactory backlog of unfilled retail orders. This obviously foreshadows a continuance of deliveries at current rates for some time to come. The company expects to increase its schedule for August.

Graham-Paige Motor Corp. July production totaled 4849 cars, according to an announcement by Robert C. Graham, sales manager. This brings Graham-Paige total production for the first seven months to 59,347 units, representing a gain of 25 per cent over the corresponding period last year.

Chevrolet Motor Co. announces production of 137,831 cars and trucks in July, exceeding any previous July in its history by large margin. Production in July last year was 120,863 units. Chevrolet officials indicate production in August will be continued at high level.

Olds Motor Works reports July shipments of Oldsmobiles and Vikings as 11,220. Shipments in first seven months this year were 81,596 cars as compared with 58,613 for the same period last year, an increase of more than 39 per cent. Factory officials report unusually heavy demand for Oldsmobiles and Vikings.

Studebaker dealers delivered 10,385 cars at retail in July. This record for July was exceeded only once in the past six years and represents 33 per cent gain over June of this year. The last ten days of July were bigger than any corresponding period in the history of the company. With new reduced prices just announced, the company is expecting an increase in business this month.

Studebaker Prices Down $20 to $250

Two New Models Announced as Factory Makes Reductions

DETROIT, Aug. 5—Price reductions ranging from $20 to $250 below former levels on more than 30 Studebaker models were made effective today by the Studebaker Corp. of America.

With this new schedule, the five-passenger President Eight Sedan will be offered at $1,735, and the seven-passenger President Sedan at $1,995; the Commander Eight Sedan at $1,475; Commander Six Sedan at $1,325; the Dictator Eight Sedan at $1,235 and a Dictator Six Sedan at $1,095.

These new prices in conjunction with the introduction of the new Dictator Six Series, July 10, at reductions ranging from $150 to $250, brings Studebaker prices to a level predicted several months ago when the corporation announced a policy of intensive economy and consolidation in production as part of its one profit program. These reductions have now been made possible by increasing volume and by the concentration of all Studebaker manufacturing operations at South Bend, it was announced.

Coincidental with the August 5 price schedule, Studebaker will also announce a new seven-passenger Commander Eight Sedan priced at $1,635 and a President Limousine at $2,175, thus adding two new units to its eight-cylinder line. Studebaker is selling more eight-cylinder automobiles than any manufacturer in America or foreign countries.

Price reductions on the President Eight (135 in. wheelbase) range from $155 to $225, as follows: Brougham for five, $2,350 to $2,195; Sedan for seven, $2,175 to $1,995; State Sedan for seven, $2,350 to $2,175; State Limousine for seven, $2,575 to $2,350. On the 125 in. wheelbase, President model reductions range from $20 to $50, as follows: Sedan for five, $1,785 to $1,735; State Sedan for five, and Convertible Cabriolet for four, $1,895 to $1,875; State Roadster for four (five wire wheels), $1,785 to $1,735, and Victoria for four, $1,895 to $1,875.

In the Commander Eight line, reductions range from $20 to $100, as follows: Sedan for five, $1,525 to $1,475; Regal Sedan for five, $1,645 to $1,625; Brougham for five, $1,675 to $1,650; Victoria for four, $1,525 to $1,475; Convertible Cabriolet for four, $1,645 to $1,595; Coupe for two, $1,495 to $1,445; Coupe for four, $1,550 to $1,495; Regal Tourer for five, $1,595 to $1,545; Tourer for five, $1,495 to $1,445; Regal Roadster for four (five wire wheels), $1,595 to $1,495.

Commander Six reductions range from $50 to $105, as follows: Sedan for five, $1,375 to $1,325; Regal Sedan for five, $1,495 to $1,445; Brougham for five, $1,525 to $1,475; Victoria for four, $1,375 to $1,325; Convertible Cabriolet for four, $1,495 to $1,445; Coupe for two, $1,350 to $1,245; Coupe for four, $1,425 to $1,325; Regal Roadster for four (five wire wheels), $1,450 to $1,395.

Dictator Eight reductions are from $50 to $100, as follows: Sedan for five, $1,335 to $1,235; Club Sedan for five, $1,235 to $1,185; Regal Sedan for five, $1,435 to $1,335; Tourer, $1,285 to $1,235.

Lakey Prospects Bright as Earnings Gain, Report

MUSKEGON, MICH., Aug. 8—Prospects of Lakey Foundry & Machine Co. are bright, Herman Becker, president, said, as it enters its fourth quarter after showing substantial increased earnings in that period over a corresponding period last year. "Orders on hand for the next five months will require capacity production, resulting in a 25 per cent increase in dollar sales volume, a new record, and will be reflected in a sharp gain in earnings," he pointed out.

"Benefits from the installation of the modern conveyor system in our main foundry unit are now being realized," said Mr. Becker. "This enables us to step up our cylinder block production schedule fifty per cent to meet the demand of firm customers which include two large automobile manufacturers and the Continental Motors Corp.

Cord Production Begun; See 1500 Cars a Month

AUBURN, IND., Aug. 8—Shipments of Auburn Automobile Co.'s new front-drive Cord car have begun to distributors and dealers in distant points. Maximum production is set at around 1500 cars a month, an unusually high figure for a car in this price class. Production schedule calls for around 1100 cars for August.

One assembly line is now operating at the rate of 35 cars a day. Operation of a second assembly line, which will be started soon, will more than double this daily production. It is expected maximum production on both lines will be reached in September and 5000 cars will be built by Dec. 1. Orders for nearly 2000 cars are on file with the factory. The car is priced slightly over $3,000.

Marmon Declares $1 a Share

INDIANAPOLIS, IND., Aug. 6—Directors of the Marmon Motor Car Co. meeting here today, declared the regular quarterly dividend of $1 per share on 260,000 shares of common stock outstanding, payable Sept. 1 to stockholders of record Aug. 16.

Bosch to Show Magnetos

NEW YORK, Aug. 5—The Robert Bosch Magneto Co. will exhibit three new magnetos at the Cleveland Aviation show.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, Aug. 8—Retail trade is in the process of clearing out summer goods, and wholesale buying for fall business is good. General business is making a much better mid-summer showing than usual, while the large industries continue on a level of activity above a year ago.

BUILDING CONTRACTS

Building contracts awarded in 37 Eastern States during the period from July 20 through July 31, according to a report issued by F. W. Dodge Corporation, amounted to $250,475,400. Average daily contracts awarded during July amounted to $25,228,300, as against $20,995,800 for June and $22,439,700 for the corresponding month last year.

COAL PRODUCTION

Production of bituminous coal for the week ended July 20 amounted to 9,198,000 tons, as compared with 9,432,000 tons in the preceding week and 8,642,000 tons in the corresponding week last year. Production of Pennsylvania anthracite during the same week amounted to 1,062,000 tons, as compared with 1,068,000 tons in the preceding week and 1,195,000 tons a year ago.

CAR LOADINGS

Railway freight loadings for the week ended July 20 totaled 1,078,659 cars, which marks an increase of 44,852 cars over those in the corresponding week a year ago and an increase of 66,110 cars over those in the corresponding week two years ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended August 3 stood at 98.6, as against 99.2 the week before and 98.8 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended July 31 were 16 per cent above those in the corresponding period last year.

STOCK MARKET

The stock market last Monday continued the downward trend manifested during the latter part of the preceding week. Tuesday a revival was well under way, which continued throughout the week.

FEDERAL RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended July 31 indicated some credit expansion. Holdings of discounted bills increased $11,800,000, while there were increases of $5,700,000 in holdings of bills bought in the open market and of $1,600,000 in holdings of Government securities. Member bank reserve deposits decreased $1,600,000. The reserve ratio on July 31 was 74.4 per cent, as against 74.7 a week earlier.

Alloy Steel Headed for Brisker Pace

Increased Production is Reflected in Better Specifications

NEW YORK, Aug. 8—Stepping up of production on new models by a number of passenger motor car manufacturers is reflected to some extent in better specifications for steel bars. Having tapered off in July, the movement of automotive alloy steels is now thought to be headed once more for a brisker pace.

With some of the sheet rollers having a sufficiently heavy backlog to carry them through the third quarter, the dent made into production by the hot weather assumes somewhat more prominence than in years of less active steel demand. Sheet mill operatives are exposed to more of an ordeal in hot weather than most of the other steel mill workers, and the maintenance of full crews is not always an easy task. Moreover, overhauling of mechanical equipment frequently can not be delayed.

Of 120 Mahoning Valley mills, 110 are in operation this week. Some of the strip mills encounter difficulty in maintaining well-balanced operating schedules because of scant backlogs, especially so of cold-rolled strip. Manufacturers of low-priced cars continue, however, to call for good-sized tonnages of certain widths of strip-steel. Prices hold fairly steady.

Here and there soft spots are encountered in the market, but concessions chiefly apply to individual orders and are so slight that they cannot be said to affect the market as a whole. The sheet bar market appears to have settled on a $35 basis. Reports are current that billets and slabs have been bought by some finishing mills at $1 below the current level for sheet bars.

Pig Iron—Current inquiry from automotive foundries is mostly for single carloads. Prices are unchanged all along the line. In some cases third-quarter contracts provide for their extension to include the remainder of the year.

Aluminum—Slightly more interest is being shown by automotive consumers in offerings this week. The market for both virgin and remelt metal is in excellent supply. Clippings are more plentiful than in some time. Prices are unchanged.

Copper—A considerable amount of metal was contracted for by fabricating interests late last week. Producers predict heavy demand during the last four months of the year, but couple with these predictions expectations of more orderly market conditions than those which prevailed during the last buying movement when abnormally high price levels were in vogue for a brief period.

Tin—American tin deliveries for the first seven months of 1929 established a new high record of 55,055 tons, an increase of more than 7000 tons over the previous high record established in 1926, the heavy takings of automotive consumers being one of the principal causes for this expansion.

Financial Notes

Marlin-Rockwell Corp. and subsidiaries report net profit for the six months ended June 30 after all charges of $1,402,014. This is equivalent to $3.86 a share on common stock and compares with $965,806, or $2.66 a share, for the first half of the previous year. Earnings for the second quarter were $699,308, or $1.92 a share, as compared with $315,190, or $1.42 a share, for the first six months of 1928.

Thermoid Co. reports net income of $572,777, or $2.42 a share, on the outstanding stock as of June 30. This figure includes $154,926, or 51 per cent, of the income of the Southern Asbestos Co., partially owned subsidiary of the Thermoid Co.

Johns-Manville Corp. and subsidiaries report net profit for the first half of the current year of $3,039,096 after all charges. This is equivalent to $3.77 a share on common stock and compares with $2,373,144, or $2.81 a share, for the first half of the previous year. Earnings for the second quarter were $1,933,007, or $2.40 a share, as compared with $1,600,438, or $1.96 a share, for the corresponding quarter of last year.

Mullins Mfg. Corp. reports net earnings for the first six months of 1929 of $341,700 after all charges. This is equivalent to $2.36 a share on common stock and compares with $443,859 for the corresponding period last year before federal taxes. Earnings for the June quarter were $177,444, equivalent after preferred dividends, to $1.24 a share, and compare with $237,878, or $2.18 a share, for the corresponding quarter of 1928.

Goodyear Tire & Rubber Co. reports net income for the first six months of the current year of $12,633,865, equivalent after preferred dividends to $7.02 a share on common stock and compares with $3,074,200, or 33 cents a share, for the corresponding period a year ago.

Commercial Credit Corp. reports net credit to undivided profits for the first half of 1929 of $570,283 as compared with $351,826 for the corresponding period of last year.

Continental-Diamond Fibre Co. reports for quarter ended June 30, 1929, net profit of $456,130 after depreciation and federal taxes, equivalent to $1.01 a share earned on 450,000 no-par shares of stock now outstanding. This compares with $469,279 in preceding quarter, or $1.04 a share on same number of shares, making net profit for first six months of 1929, of $925,409 or $2.05 a share.

Caterpillar Tractor Co., San Francisco, has earned close to $3 a share on its 1,882,240 shares of common in the first half of the year. As the second half year will include a part of the big Soviet tractor order covering 1300 of company's large No. 60 machines and involving about $5,000,000, in addition to normal business, it is regarded as certain company should show in excess of $6 for year and will be in position to make extra distribution.

Driver-Harris Co., makers of special alloys, reports for six months ended June 30, 1929, net profit of $356,610 after taxes and charges, equivalent after preferred dividend requirements, to $34.67 a share (par $100) on 9138 shares of common stock.

Lincoln Price Cut is Announced on All Cars

DETROIT, Aug. 8—Price reductions ranging up to $650 were announced by Lincoln Motor Co., effective today, on all established body types. No anticipation of change in model was announced.

Model	Former Price	New Price
Sport phaeton	$4,650	$4,200
Sport phaeton with tonneau cowl and windshield	5,050	4,400
Sport touring	4,650	4,200
Four-passenger coupe	4,800	4,400
Club roadster	4,900	4,400
Town sedan	4,900	4,400
Five-passenger sedan	5,000	4,500
Seven-passenger sedan	5,100	4,700
Seven-passenger limousine	5,300	4,900

Prices of custom-built types were also reduced proportionately.

Berger Joins Mitchell Specialty

HOLMESBURG, PA., Aug. 7—E. A. Berger, formerly with Landis Engineering & Mfg. Co., Waynesboro, Pa., is now in charge of engineering of the shock absorber division of the Mitchell Specialty Corp.

Automobile Securities Drop

NEW YORK, Aug. 5—Securities of seven leading motor manufacturing companies depreciated 4½ per cent in value during July, according to a survey conducted by Frazier Jelke & Co. This compares with an increase of 4.7 per cent in stock values of 100 representative companies analyzed by these bankers. The market value of these motor stocks decreased $200,258,000 during the month.

Guggenheim Contest Closes Sept. 1

NEW YORK, Aug. 5—The Daniel Guggenheim Fund for the Promotion of Aeronautics has announced that entries for its safe aircraft competition will close on September 1. The competition itself will close on October 31. Any application for entry in this competition which is mailed on or before September 1 will be considered as having been entered on that date.

Durant Names Jersey Distributor

DETROIT, Aug. 7—The U. S. Motor Sales Co., West New York, N. J., has been appointed Durant distributor for nine counties of northern New Jersey, it is announced by Durant Motors. Thirty-eight Durant dealers will operate in this territory under the new distributor.

Timken-Detroit Co. Earnings Increase

First Half Shows Net of $880,708 or 76 Cents Per Share

DETROIT, Aug. 5 — Timken-Detroit Axle Co. reports for six months ended June 30, 1929, net profits of $880,708 after all charges, including Federal taxes, equivalent, after dividend requirements on the seven per cent preferred stock, to 76 cents a share earned on 992,096 shares of common stock. This compares with $716,410 or 70 cents a share on 834,596 shares in the first six months of 1928. The increase in capital stock was due to the issuance of 157,500 shares for the purchase of the Wisconsin Parts Co.

After adjusting reserves for Federal taxes on prior years, the surplus account now stands at $4,316,429.11, showing an increase of $166,208.13 over Dec. 31, 1928, after paying dividends in the six months' period amounting to $510,444.06 and after charging off $429,-334.49 from the books of the Wisconsin Axle Co., for good will, dies, jigs, fixtures, etc.

Ford Breaks July Records

DETROIT, Aug. 8—Ford Motor Co. announced today world production for July as 196,505 cars and trucks. Of that figure, domestic production was 180,804 units. These figures break all records for the month of July in the company's history. Retail deliveries to consumers, domestic, totaled 170,676 cars and trucks, which is the greatest record of retail deliveries in the company's history. The company reports domestic orders for August approximate 200,000 units and it will make every effort to meet the demand, officials said.

McAleer Trebles Shipments

DETROIT, Aug. 8—The McAleer Manufacturing Co., manufacturers of automobile polishing compounds, reports July shipments were three times greater than those for the same month a year ago and that shipments for the first half of this year amount to 100 per cent more than for the same half year in 1928, according to figures just given out by C. H. McAleer, president. These polishing compounds, according to Mr. McAleer, are now being used by 92 per cent of the motor car manufacturers in the United States.

Wayne Sales Increase

DETROIT, Aug. 5—Passenger car sales in Wayne County during July totaled 10,447, which compares with 9335 for July, 1928, and with 5433 in July, 1927. The total for the first seven months of 1929 is 88,132, as compared with 52,006 for the corresponding period in 1928. Ford sales accounted for about 45 per cent of the July total, registrations in this make of car being 4575. Chevrolet sales last month showed a total of 1490, while Essex ranked third on the list with a total of 873 cars. Sales of commercial cars and buses last month totaled 872 units, bringing the number of sales in the first seven months to 6722, as compared with 3345 during the corresponding period of 1928.

Borg-Warner to Acquire Another Company, Report

NEW YORK, Aug. 7—Borg-Warner Corp. has elected B. A. Eckhart as a director. Mr. Eckhart is a director of a number of Mid-West banks, of the Erie Railroad, Armour & Co. and Montgomery, Ward & Co.

The company has announced that negotiations have been practically completed for the acquisition of another company. Details as to this acquisition will not be made public for several days.

United Buys Stearman

NEW YORK, Aug. 5—United Aircraft & Transport Corp. has acquired the Stearman Aircraft Co. of Wichita, manufacturer of commercial airplanes, through an exchange of stock, according to announcement made by Frederick B. Rentschler, president of United.

The Stearman company will operate as a unit of United without any change in personnel. The merger was accomplished through an exchange of stock on the basis of 3¾ shares of Stearman for one share of United. Thus for the outstanding 100,000 shares of Stearman stock 26,667 shares of United Stock will be used.

Stinson Reports Sales Gain

DETROIT, Aug. 7—Stinson Aircraft Corp., of Wayne, Mich., received orders representing $345,828 during July, exceeding by a large margin orders in any previous month of its history, according to a statement by Edward A. Stinson, president, yesterday. "About half of these orders were filled in July when $177,116 worth of airplanes were delivered. Sales during the first seven months totaled $814,917, a gain of $139,-667 over the same period last year," Mr. Stinson said.

Wayne Tool and Krueger to Merge

DETROIT, Aug. 8—Airparts Corp. is being organized to acquire Wayne Tool Co. and H. R. Krueger Co., both of Detroit, according to announcement today by Joseph W. Rothmeyer, who is now head of the Wayne Tool Co. "Mr. Krueger will be associated with me in the management of the company with Edward R. Narr of Chicago; Louis Ruthenberg, who has occupied several executive positions with General Motors and is now president of Copeland Products, Inc.; John L. Brown, director of Outboard Motors Corp.; Charles A. Floyd of J. D. Currie and Co., becoming members of the board," Mr. Rothmeyer said.

Tiny Car Awaiting Distribution Plan

Manufacture and Sales Methods Incomplete, Says Martin

Actual production of a very small, light car, designed by James V. Martin, of Martin Aeroplane Factory, Garden City, L. I., is contemplated as soon as plans for manufacture and distribution are completed, Mr. Martin said when interviewed by *Automotive Industries* in Washington.

The car, which is less than half the size of the usual automobile, is of 59-in. wheelbase and weighs about 600 pounds. It has been under development for several years. An announcement of its design appeared in "The Light Car and Cyclecar," London, April 23, 1926, and another article was published in the same magazine Sept. 21, 1928.

According to Mr. Martin, the car will have a four-cylinder air-cooled engine, conventional clutch, three-speed gear box, airplane suspension and other well-tried features which are, however, new in automobile construction.

Although Mr. Martin discussed the mechanical features of the car, he refused to talk about the financial plans of the company which he said plans to build the car.

It is reported that a mail order house has been considering marketing this car or a similar low-priced automobile.

Navy's Schneider Entry Launched at Annapolis

ANNAPOLIS, MD., Aug. 7—The Mercury Racer, a seaplane built under the direction of Lieut. Alford J. Williams, and designed to enter the Schneider Cup Races at Cowes, Isle of Wight, Sept. 6 and 7, was launched here today in the presence of several hundred Navy men.

The plane is a middle wing monoplane type, with a span of 26½ ft. The fuselage, wings, and tail are wood, and the control surfaces are metal. The engine is a 24-cylinder Packard "X", which is said to develop 1100 hp. Cooling is accomplished by circulation of the cooling medium through the double-bottom pontoons of the plane.

Spicer Earnings Increased

NEW YORK, Aug. 7—The Spicer Mfg. Co. reports net profit, for the six months ended June 30 after all charges, of $1,552,824. This compares with $854,955 for the first half of last year. Earnings in the June quarter were $790,266 as compared with $434,687 in the corresponding quarter last year.

A. G. Redmond Incorporates

DETROIT, Aug. 7—The A. G. Redmond Co., maker of automotive parts and electric motors, which has a factory in Flint, Mich., has been incorporated with a capitalization of $50,000.

Air C. of C. to Hold Cleveland Sessions

Problems of Industry to be Discussed at Air Show

NEW YORK, Aug. 5—The Aeronautical Chamber of Commerce of America will hold meetings in Cleveland August 26 to September 2 to consider the economic problems arising out of the growth of the aircraft industry during the past twelve months.

These meetings will include conferences of airplane manufacturers, motor manufacturers, accessory and equipment manufacturers, flying school operators, fuel and lubricant manufacturers, air transport operators and dealers and distributors of aircraft.

The first four days of the meeting will be concerned with technical problems of the industry, relations with the government and the adjustment of aircraft production to demand.

Manufacturers of commercial airplanes will meet with officials of the department of commerce on the fifth day to consider possible changes in the airworthiness requirements set up by the department.

Curtiss, Wright Sales Increase, Report Shows

NEW YORK, Aug. 8—Figures of the Curtiss Aeroplane and Motor Co., Inc., for the six months ended on June 30, show total sales of $6,230,454, comparing with $5,118,098 in the first six months of 1928. Unfilled orders on July 1 amounted to $6,480,387, comparing with $5,255,545 a year ago.

The Wright Aeronautical Corporation for the six months to June 30, reports gross sales totaling $6,084,235, as against $3,579,823 in the 1928 period. The number of engines shipped for the six months was 1300, as against 658 in the same period for last year.

Mack Announces "Super"

NEW YORK, Aug. 7—A new Mack "super-duty" truck in four and six-wheel types is announced by Mack Trucks, Inc. They will carry from 7½ to 10 tons at 30 miles an hour and will, it is claimed, climb a 20 per cent grade with ease. The trucks are powered with 6-cylinder high-compression engines of 150 horsepower. They retain the chain drive, a characteristic of Mack trucks.

Cotton Picker in Production

ST. LOUIS, Aug. 5—Moon Motor Car Co. announced that it has begun production on its new cotton-picking machine, the first of its kind ever to be manufactured. The first machine, just produced, will be kept on display at the factory here. The machine weighs 300 lb. The company announces that it expects to turn out at least 20,000 units yearly.

Goodyear Zep Plans Aired as Graf Leaves

NEW YORK, Aug. 8—Plans for building two huge commercial lighter-than-air liners were revived here following the visit and proposed start of the around-the-world trip of the Graf Zeppelin. Officials of the Goodyear Tire & Rubber Co. and the Goodyear Zeppelin Corp., here this week, discussed a trans-Pacific service by a fleet of airships which will be about twice the size of the Graf.

Brockway Adds Two New Trucks to Line

CORTLAND, N. Y., Aug. 6—One six-wheeled and a companion four-wheeled truck chassis have been added to the line of the Brockway-Indiana Motor Truck Corp. The six-wheeler is rated at 40,000 lb. gross weight capacity as a truck and 70,000 lb. gross weight capacity for a truck-trailer combination. The corresponding ratings for the four-wheel unit are 30,000 and 65,000 lb.

Both models are equipped with the Continental 16-H six-cylinder 4¾ by 5¾ in. engine, Brown-Lipe multiple disk clutch and Brown-Lipe seven-speed transmission. In the six-wheeler a Timken tandem worm-drive axle unit is used, and in the four-wheeler a single worm-drive axle of the same make.

India Tire Earnings Gain

AKRON, Aug. 8—Earnings for the India Tire & Rubber Co. of Mogadore, for the first six months of 1929 were the largest in any similar period of the company's history, and prospects for a considerable expansion in the next six months are bright, W. G. Klauss, president, reported Friday. Net income for the period ending June 30, after all deductions, including interest, regular dividend requirements and federal income tax, totaled $245,034.36, equivalent to $2.72 on the 83,000 outstanding common shares. Sales for the period totaled $2,544,501.09.

Sir William Letts Returns

NEW YORK, Aug. 7—Sir William Letts, who is in charge of the British operations affiliated with Willys-Overland Co., returns to England on the S. S. Berengaria tonight after a visit of a few weeks in this country. John N. Willys is accompanying him. Mr. Willys stated that this trip is purely a personal pleasure trip on his part.

Pines Winterfront Earnings

NEW YORK, Aug. 8—Pines Winterfront Co. has declared quarterly dividend of 25 cents and a two per cent stock dividend, both payable September 3, to stockholders of record August 17.

Hercules Chosen as Amtorg Consultant

Soviet Truck Factory Will be Assisted by Canton Firm

NEW YORK, Aug. 8—Hercules Motors Corp. of Canton, Ohio, has entered into an agreement with the Amtorg Trading Corp. to render technical assistance in the construction of heavy automobile truck engines in the Soviet factory at Yaroslavl, now under construction, according to announcement made by Saul G. Bron, chairman of the board of directors of Amtorg.

The Amtorg has also ordered 1700 engines from the Hercules company which will be installed in trucks produced in Soviet plants. The Hercules company, according to Mr. Bron's statement, will supply the Soviet Automobile Trust with the necessary drawings and other technical data and will send its engineers to the U. S. S. R. to assist in designing and manufacturing engines. In addition Soviet engineers will study the various phases of production of motors in the Hercules plant. These engines are to be used in 3½-ton trucks which are to be produced in the Yaroslavl plant at the rate of 20,000 a year.

This is one of the steps in the automobile building program outlined by the Soviet. Other phases include the manufacture of 100,000 Ford type Model A cars and Model A A trucks per year at the Nizhni-Novgorod factory which will be built with the technical cooperation of the Ford Motor Co. The Arthur J. Brandt Co. is furnishing engineering assistance in the expansion of the Amo plant at Moscow, which will produce 25,000 2½-ton trucks, passenger cars and buses a year.

Ainsworth Declares Dividend

NEW YORK, Aug. 6—The Ainsworth Mfg. Corp. has declared an extra dividend of four per cent, payable in four equal instalments, in addition to the regular quarterly cash dividend of 62½ cents.

The cash dividend and first instalment of the extra stock dividend will be payable Sept. 3 to stockholders of record Aug. 20. The remainder of the stock dividend will be payable Dec. 2, 1929, and March 1 and June 2, 1930, to stockholders of record Nov. 20, 1929, and February and May, 1930, respectively. Earnings for the first six months of the current year totaled $698,756, or $4.44 a share, on outstanding stock. Cash and marketable securities are in excess of $1,000,000.

Houdaille Buys Skinner, Ltd.

NEW YORK, Aug. 7—Houdaille-Hershey Corp. has acquired complete ownership of the Skinner Co., Ltd., of Canada, according to announcement made by Claire L. Barnes, president of Houdaille-Hershey.

Men of the Industry and What They Are Doing

Long Joins Central Body As Chief Tool Designer

E. P. Long, formerly master mechanic with Dodge Bros., has been appointed chief tool designer for Central Body Co., a unit of Auburn Automobile Co., E. O. Penry, general superintendent, announced. He is an experienced automobile man and spent more than 10 years with the Dodge organization.

He will assume his duties immediately. Production facilities of Auburn have increased nearly 800 per cent in the last five years and the unusual demand for the Auburn line of cars has been so great in 1929 that the addition of a considerably larger production personnel has become necessary.

Zens Leaves Jordan

Paul Zens, for twelve years an officer and director of Jordan Motor Car Co., has just been elected a director and vice-president of Continental Brake Shoe & Equipment Co., New York, in charge of the Cleveland office. He was one of the original four members of the Jordan company, going to Cleveland with Edward S. Jordan from the old Thomas B. Jeffery Co., Kenosha. He was in charge of purchases and later in charge of sales.

Thien Promoted by G.M. Export

Robert R. Thien, for the past two and a half years director of advertising of General Motors Export Co., has been appointed assistant general sales manager, according to announcement made by Harry Tipper, general sales manager. Allan T. McKay, formerly of Calkins & Holden, has been appointed to succeed Mr. Thien as manager of the advertising division, and Norman S. Foster has been named his assistant.

Peck Elected Vice-President of G. E.

Darius E. Peck, assistant manager of the law department of the General Electric Co. since 1920, was elected vice-president and general counsel of the company at a meeting of the board of directors in New York on August 1. At the same time President Gerard Swope announced the retirement of Allen H. Jackson, who has been vice-president and general counsel since 1922 and associated in the company's law department since 1902.

Cornell With Motor Credit

C. C. Cornell, for many years handling foreign credit work for a number of New York banks, has been appointed assistant vice-president of Motor Dealers Credit Corp., subsidiary of Commercial Investment Trust Corp., handling its overseas account.

Wade Morton

who has been appointed sales manager of the Cord front-wheel drive division of Auburn Automobile Co. He has been connected with Auburn for the past three years and was manager of contests. He also designed the Auburn cabin speedster

Pierre du Pont Returns

Pierre S. du Pont, chairman of E. I. du Pont de Nemours & Co., returned recently from a five-weeks' trip abroad.

Sir Eric Visiting U. S.

Sir Eric Geddes, chairman of Dunlop Rubber Co., is making his annual business trip to this country.

Henderson Heads Pitcairn

Col. Paul Henderson, vice-president and general manager of Transcontinental Air Transport, was elected president of Pitcairn Air Lines, a New York to Miami line, recently absorbed by the holding company which controls T.A.T.

Elected by Commercial Credit

William H. Hill, of Kidder, Peabody & Co., Boston, and George Ramsey, of Harris, Forbes & Co., New York, have been elected members of the board of Commercial Credit Co., Baltimore.

Sperry to Speak on Welds

Elmer A. Sperry, president of the American Society of Mechanical Engineers, will address the American Welding Society at its fall meeting in Cleveland, September 9 to 13. He will speak on Non-Destructive Tests on Welds, which will be one of nine research papers to be presented.

Fruehauf Trailer Names A. C. Fruehauf Chairman

The Fruehauf Trailer Co., Detroit, has elected August C. Fruehauf chairman of the board and Harvey C. Fruehauf president. The other officers of the company are: Harry R. Fruehauf, vice-president and director of purchases; Earl L. Vosler, vice-president and treasurer; G. W. Chamberlin, vice-president and director of sales, and Roy W. Jacobs, secretary and assistant treasurer.

Thompson Joins Auburn

C. N. Thompson, formerly resident engineer for Hupmobile at the Chandler plant, Cleveland, has become associated with the Auburn Automobile Co. as chassis engineer, R. H. Faulkner, vice-president, announced. Thompson was with the Chandler organization for 12 years previous to its acquisition by Hupmobile, where he was assistant engineer. Previous to this connection he was an engineer with Continental Motors and the Stevens-Duryea Co.

White Promotes Salesmen

J. C. Arden, district manager of the White Motor Co. plant in Omaha for the past three years, has been appointed district manager of the New Haven, Conn., branch, succeeding C. E. Rees, resigned. C. Miller, Denver salesman, takes Mr. Arden's place.

Long Named Western Manager

Ray Long has been appointed manager of the western branch of the Continental Motors Corp. at Los Angeles. He has been closely associated with the automotive industry since 1910, serving in an engineering capacity for several of the pioneer truck and passenger car builders. For the past five years he has been assistant manager of the industrial division.

Seiler Is Bank Director

Paul W. Seiler, president of the General Motors Truck Co., has been elected a director of the First National Bank & Trust Co., Pontiac, Mich., to fill the unexpired term of the late Arthur F. Newberry.

Plummer is Promoted

Robert K. Plummer has been appointed assistant sales manager of Gears & Forgings, Inc., Cleveland. George W. Davis, formerly with the Chicago office, will take Mr. Plummer's place as district manager at Milwaukee.

Marshall Joins Chain Belt

Robert B. Marshall, conveyor sales engineer, has joined the Chain Belt Co.'s Conveyor Division.

Studebaker-Pierce-Arrow Survey Shows Trend to Straight Eights

A world-wide trend toward the straight-eight motor car is indicated by sales data recently compiled by the Studebaker-Pierce-Arrow Export Corp. The figures show that factory sales of Studebaker President Eight and Commander models in world markets increased 173 per cent during the first six months of 1929 over the corresponding period of 1928.

A survey recently made by Studebaker reveals a similar preference for the eight-cylinder car in the United States. Registrations of six and eight-cylinder cars in 18 leading cities for four months this year were compiled and compared with registrations during the same months of 1928.

It was found that registrations of eight-cylinder cars had increased 82 per cent, while six-cylinder registrations showed a loss of 8 per cent.

A still larger increase in overseas eight-cylinder business is anticipated during the last half of 1929, according to Arvid L. Frank, sales manager of the Studebaker-Pierce-Arrow Export Corporation.

"Studebaker's new Dictator Eight will be largely responsible for the gain," he said, "since it offers eight-cylinder performance at a price well within the six-cylinder field. With three lines of eights—the new Dictator and the popular President and Commander—the corporation is well prepared to meet the growing demand for eight-cylinder cars."

Steel & Tubes Opens Million-Dollar Plant

CLEVELAND, Aug. 8 — Steel & Tubes, Inc., recently opened a new welded steel tubing plant at Ferndale, Mich. This plant is a model tube plant costing over $1,000,000 including equipment. The Ferndale unit will take the place of a former plant at Toledo, Ohio, but will be much larger in order to take care of increased business. The building is 537 feet long by 211 feet wide, containing 113,000 square feet, or a little over 2½ acres of manufacturing floor space.

Traffic Bothers D. C.

WASHINGTON, Aug. 8—The "left turn" controversy, which has been claiming attention of District of Columbia motorists and automotive dealers reached an impasse this week with two polls showing divergent results. The A.A.A. conducted a poll which showed that a majority of members who voted favored the standard "Hoover left turn" as against the "rotary left turn" now in force at important intersections. A daily newspaper conducted another poll which showed the opposite result. Traffic officials have decided to continue the "rotary left turn" in force.

Reports Fewer Taxi Accidents

NEW YORK, Aug. 6—Ernest H. Miller, president of Parmalee Transportation Co., announces that its subsidiary the Chicago Yellow Cab Co., operated its 2400 cabs over 40,427,682 miles during the first six months of 1929 with 40 per cent fewer accidents than in any corresponding period of the company's existence. The cabs averaged 65,000 trips a day and carried 16,100,674 passengers during that period.

Holds Gas Tax Is Deductible

WASHINGTON, Aug. 8—The gasoline tax imposed by Kentucky is deductible from the gross income of the consumer who pays it, the Bureau of Internal Revenue ruled this week. The tax, it was held, is upon the consumption or upon the privilege of using. If the tax is added to or made a part of the business expense of the consumer, it cannot be deducted separately as a tax, it was ruled.

Financiers Fly to View Detroit Aircraft Plant

DETROIT, Aug. 1—Twenty bankers, representing some of the most important investment firms in New York, Boston, Columbus, Cleveland and other cities, flew here yesterday from Cleveland to inspect local properties of the Detroit Aircraft Corp. The trip is part of a tour through the middle west to visit various properties of the corporation. Upon their arrival here they were joined by Charles S. Mott, a director of Detroit Aircraft and vice-president of General Motors.

Among the visiting bankers were Morgan Belmont, Frank J. Daly, Herman K. Harrison, N. E. Waldman, William H. Gilmartin, Edward E. Murphy, Jr., Robert E. White, Clinton S. Cook, Bernard N. Gordy, Bernard Fischer, Carl Bixby, Nathaniel J. Sayers, Charles R. Carney and William McCarthy of August Belmont & Co.; Chauncey D. Hunter and E. K. Pletcher, president and secretary respectively of Williams, Hunter & Platt, New York; Victor Salasman, aviation expert of L. F. Rothschild & Co., New York; and Mr. Brand of Claude Meeker & Co., Columbus.

Before coming to Detroit the bankers inspected the plant of the Winton Engine Co., Cleveland, a subsidiary of Detroit Aircraft.

Bogota Sales Are Slow

WASHINGTON, Aug. 8—Sales of automobiles and trucks are reported slow in Bogota, Colombia, according to a cable received this week by the Department of Commerce from its Bogota representative. Purchases are limited to staple commodities, the report states.

U. S. Helped States to Pave 7022 Miles

Total of 78,096 Miles Are Reported by Department of Agriculture

WASHINGTON, Aug. 7—During the fiscal year 1929, the Federal Government cooperated with the states in the improvement of 7022 miles of Federal-aid highways, bringing the total mileage of the system improved with Federal aid to 78,096, according to figures of the Bureau of Public Roads of the United States Department of Agriculture.

The year's mileage was improved in the 48 states and Hawaii by state highway departments working in cooperation with the Federal bureau. There are approximately 188,000 miles of main interstate and intercounty highways in the Federal-aid system, of which the above mileage and approximately an equal mileage built by the states without Federal assistance is now improved.

The 7022 miles improved include 1056 miles of graded and drained earth roads, 563 miles of sand-clay, 1293 miles of gravel roads, 189 miles of waterbound macadam, 728 miles of bituminous macadam and bituminous concrete pavements, 3101 miles of Portland cement concrete pavement, and 48 miles paved with vitrified brick. Forty-four miles of bridges and approaches were also constructed.

In addition to the improved mileage, at the end of the year there were under construction with Federal aid 9526 miles, 8358 of which were undergoing initial improvement, and 1168 were being given a higher type of surface than was provided in original construction. The estimated cost of the mileage under construction is $238,158,495, which includes Federal funds in the sum of $96,500,347.

At the end of the year there were also approved for initial construction, 1833 miles of highways and a further 1065 miles to receive a higher type of surface. The total cost of the approved mileage is estimated at $61,500,674, to which Federal funds in the sum of $24,137,546 have been allotted.

Will Manufacture Accessories

DAYTON, OHIO, Aug. 6—Papers have been filed for chartering the Dayton Accessories Co., with a capital of 500 shares of no par stock for the purpose of manufacturing and distributing automotive accessories and parts as well as to hold patents on automotive devices of all kinds. The incorporators are C. A. Funkhouser, Byron Murr and H. L. Shellenberger.

Schrader to Use "Cores"

BROOKLYN, N. Y., Aug. 6—Valve insides, manufactured by A. Schrader's Son, Inc., are to be called valve "cores" hereafter.

Thirty-Six States Enact 106 Bills on Aviation in Year's Legislative Work

NEW YORK, Aug. 10—Aviation proved itself a popular subject for state legislation during the 1928-29 sessions, a report issued today by the Aeronautical Chamber of Commerce of America through its legal and legislative research service, discloses.

Two hundred and fifty bills on aviation subjects were introduced in the state legislatures during the year, with 106 of them enacted; 65 defeated, and 79 pending or action on them unavailable.

The report on the trend of legislation affecting aviation was prepared by Prof. Harry J. Freeman of New York University Law School, who is head of the legal and legislative research service of the aeronautical chamber. It marks the first concerted effort by the industry to obtain information required by several score air transport companies confronted with perplexing legislative problems and legal precedents.

The increase in legislative activity is attributed in a large measure to the growth of scheduled air transport operations, which increased from 33,317 miles daily on Aug. 1, 1928, to 80,000 miles daily on Aug. 1 this year.

Forty-one states considered legislation on aviation during the year, 36 states enacting laws on the subject; 21 defeating such measures and 18 having bills with action pending or data unavailable.

Nevada and Louisiana were the only states with legislatures in session, which did not consider such legislation. Three states, Alabama, Kentucky and Virginia, held no sessions during the 1928-29 period studied.

"The survey made for the Aeronautical Chamber of Commerce shows that there has been unprecedented legislative activity in this field," Prof. Freeman says in his report. "That the legislatures have been prompt to respond to the general interest in controlling aeronautical activity is clearly apparent. Whether or not these legislative activities have produced the results contemplated is a question for future experience to show.

"That the separate and individual activities of 41 jurisdictions by 41 separate legislative groups did not produce a more chaotic condition is something worthy of remark," Prof. Freeman says. "In view of the number of jurisdictions, the general effect of the statutes operating within the respective states has resulted in a uniformity that must be deemed commendable.

"While the major part of the legislation has been with reference to the regulation of aircraft and the establishment of airports, there has been a manifestation of some legislative activity in other fields, more particularly in connection with an attempt to cope with the new situations which have appeared with the phenomenal growth of aviation.

"Already different theories as to the proper method of meeting these problems by the enactment of statutes have appeared and probably are the forerunners of widely divergent legislative policies. The proper solution of these problems, which involves the weighing of the interests of the general public on one hand and the encouragement of the development of commercial aviation on the other, requires careful and thorough investigation."

Large Planes in Production

CINCINNATI, Aug. 8 — Construction has been begun on a three-motored, 10-passenger monoplane, to sell at approximately $15,000 less than a similar plane now used extensively in air service, by the Metal Aircraft Corp. The company has been building a single motor plane known as the Flamingo and the new ship will be the Flamingo Model G-3. Wing spread will be 58 ft. The plane will measure 41 ft., 2 in. from propeller to tip of tail and will stand 10 ft., 6 in. high. Seats for nine passengers, in addition to the pilot, will be included with a folding seat for extra passengers. Officials of the company announce the plane will be ready for service in three weeks and thereafter they will be turned out at the rate of one a week.

Island Open to U. S. Cars

WASHINGTON, Aug. 9—According to a report received this week by the Commerce Department from Assistant Trade Commissioner Charles F. Baldwin, Sydney, Australia, arrangements have been completed for the distribution of two popular low-priced American automobiles in the island of New Caledonia, a French possession in the Western Pacific. French motor cars are now used almost exclusively on the island but the two companies acting as agents for American cars believe they will be able to compete effectively with French makes.

A. K. Baylor

Armistead K. Baylor, 61, General Electric commercial engineer and veteran of the electrical industry, died suddenly early on the morning of August 1 at Ipswich, Mass., where he was summering. In 1891 Mr. Baylor went with the Thomson-Houston Electric Co. at West Lynn, Mass., and moved to Schenectady, N. Y., in 1894 when the headquarters and main offices of the General Electric Co. were established there. In 1896 he went abroad to become manager of the traction department of the British Thomson-Houston Co., becoming general sales manager there. After 14 years he returned to this country to reenter the General Electric organization, and for several years was in the commercial general department. Mr. Baylor was also vice-president, director and a member of the executive committee of the Edison Electric Appliance Co.

Government Adds Four Types of Plane Licenses

WASHINGTON, Aug. 7—Four additional type-certificates for airplanes were issued during the week of July 20, bringing the total of airplane types officially approved to 178. During the same week the Commerce Department issued three export certificates, 112 airplane mechanics' licenses, 150 pilots' licenses, 72 identification numbers and 140 airplane licenses.

In the three years since the aeronautics branch was established to promote and regulate civil aviation, the Commerce Department has licensed 4742 aircraft which are still active, 6533 airplane pilots and 6085 aviation mechanics; it has also identified 3013 planes, issued 183 expert certificates and approved 26 types of aircraft engines. The department has received more than 65,000 applications and renewal requests for its different types of licenses.

Dallas Brass to Expand

CHICAGO, ILL., Aug. 8—Contracts for three new building units to cost approximately $500,000 have been awarded by the Dallas Brass & Copper Co., according to a recent announcement by C. D. Dallas, president. These additions will be made to the present rolling mills located on a 25-acre plot at 66th Street and Grand Avenue. A substantial addition to the brass mill and two new buildings will be erected for the carpenter shop and to house the engineering department and machine shop. Founded in 1907, this company erected a three-story plant in 1920. This building at first housed a battery of mills to produce brass and copper strips and sheets.

Routes Total 22,552 Miles

WASHINGTON, Aug. 9—A total of 22,552 miles of air mail routes in the Western Hemisphere carry mail under contract with the United States Post Office, according to a report made public this week by the Post Office Department.

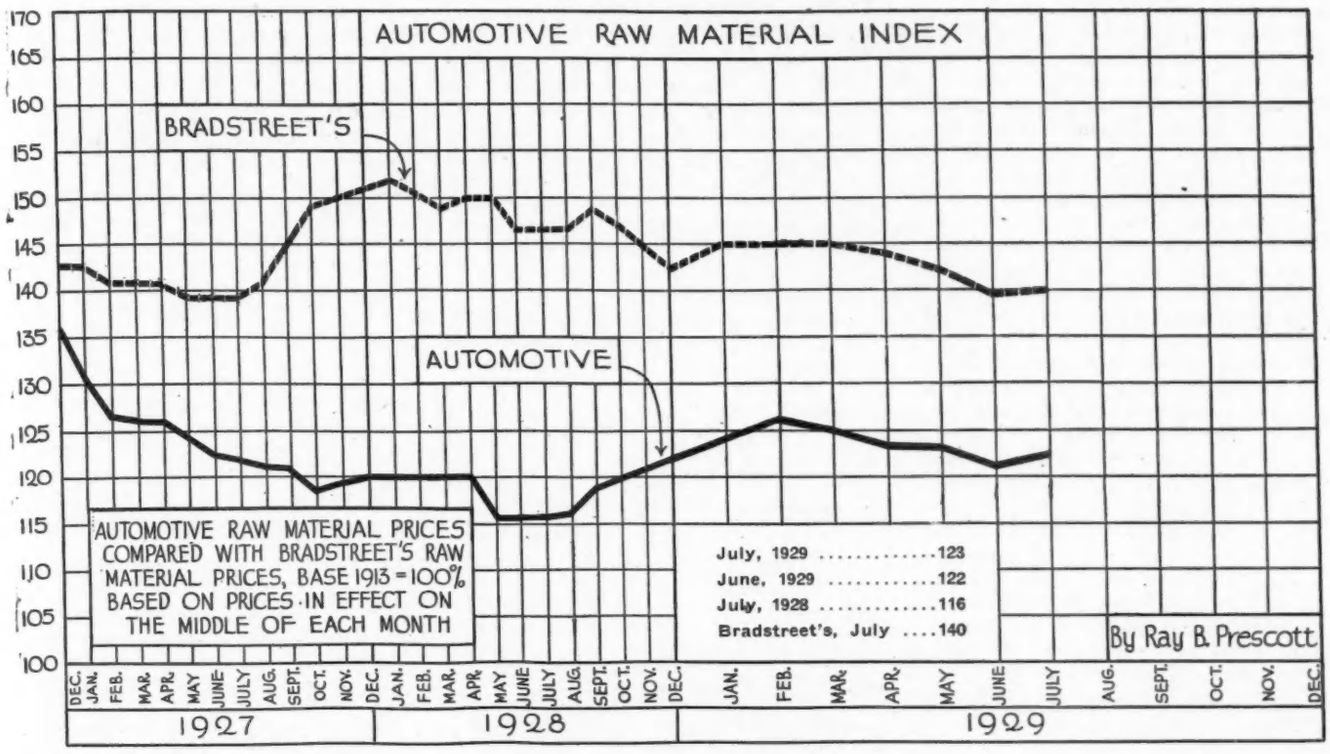
Makes Chains for New Cord

INDIANAPOLIS, IND., Aug. 7—The Link-Belt Co., Chicago, Detroit and this city, is manufacturing timing chains used on the Cord front-wheel drive car. The company manufactures timing chains for automobiles, automobile motors, trucks, buses, etc.

G.M.C. Votes 75 Cents a Share

NEW YORK, Aug. 8—Directors of General Motors Corp. voted 75 cents on common stock payable Sept. 12, to stockholders of record as of Aug. 17, and the regular quarterly dividend on preferred stock, payable Nov. 1, to stockholders of record Oct. 7.

Raw Material Prices Are Up One Point



Spain and Hotchkiss Are Working on Factory Plans

PARIS, July 24—The Spanish Government is negotiating with the Hotchkiss Automobile Co. of Paris for the formation of a national automobile factory in Spain. The managing director of the Hotchkiss concern admitted that negotiations were in hand, but stated that no decision had been reached. Hotchkiss is working at full capacity and has twice broken new ground during the past twelve months in order to keep pace with demand.

It is known that the Spanish Government is desirous of creating a home automobile industry and with this object in view has submitted propositions to several American factory representatives in Europe. Under these proposals the automobile firm was to be allowed to import parts free of duty.

Starting out as an assembly organization, the automobile company had to gradually increase the proportions manufactured in Spain until, after ten years, the cars would be 100 per cent Spanish. Apparently the main reasons for refusing to accept these propositions were the smallness of the market and the individualistic character of the buying public, which makes it difficult to sell important quantities of any one make.

Chinese Reduce Truck Duty

WASHINGTON, Aug. 9—The Chinese Commissioner of Customs has announced that motor truck chassis imported into China are now dutiable at 12½ per cent instead of 22½ per cent, which has been the rate since the early part of this year, according to an announcement this week by the Department of Commerce. The new rate became effective June 7, 1929, it was announced in a dispatch from Shanghai.

Rumania Car Imports Hit New High With 5756 Units

WASHINGTON, Aug. 9—The growth of the automotive market in Rumania during 1927 and 1928 was phenomenal, the total number of cars, trucks and buses exported from the United States to this country being 5756 last year, as compared with 3668 in 1927, or an increase of 57 per cent, according to a report received this week from Consul J. Rives Childs at Bucharest.

As compared with the number exported during 1926, the largest previous automotive year, the increase was 1076 per cent. Trucks and buses found little demand during the years previous to 1927; in 1919 a total of 114 were exported from the United States, 15 in 1921, 13 in 1925 and only 2 in 1926.

A sudden demand arose in 1927 when exports numbered 740, and grew in 1926 to the figure of 1267. The demand for passenger cars almost paralleled the growth of that for the commercial vehicle, the report says.

Hulett to Sell Franklin

NEW YORK, Aug. 6—The Hulett Motor Car Co. has been appointed distributor for the Franklin line of air-cooled automobiles in New York City, northern New Jersey and parts of New York State, Connecticut, Massachusetts and Vermont. This is said to be one of the largest distributorship deals announced in this area for more than a year. J. B. Hulett, president of the concern, who announced that an initial order of $1,500,000 has been placed with the factory at Syracuse for immediate requirements, has developed an extensive sales and service organization.

Manufacturers Join N.S.P.A.

DETROIT, Aug. 6—Twelve of the 25 new members of the National Standard Parts are manufacturers of parts and equipment. They are Cuno Engineering Corp., Meriden, Conn.; David Lupton Son's Co.; Philadelphia; Elite Mfg. Co., Ashland, Ohio; Ohio Parts Co., Cincinnati; Allen Electric & Equipment Co., Kalamazoo, Mich.; John Bean Mfg. Co., Lansing, Mich.; Berry Brothers, Inc., Detroit; E. Edelmann & Co., Chicago; Triple-A-Specialty Co., Chicago; Ajax Auto Parts Co., Racine, Wis.; Sunnen Products Co., St. Louis, and Timken Roller Bearing Sales & Service Co., Canton, Ohio.

Organizes to Make Accessories

DANVILLE, ILL., Aug. 7—The Stump Mfg. Co. has been incorporated to manufacture the Da-Tyme headlamp adjuster for automobiles and other motor accessories. Walter E. Stump, for many years manufacturer of garage and auto accessories here, is one of the incorporators.

Establishes Record in Shipments

MUSKEGON, MICH., Aug. 7—The Piston Ring Co. established a new record by shipping 29,633,916 "Quality" brand rings during the first six months of the year, according to L. F. Iverson, manager of the service division.

Iowa Saves $400 a Mile on Primary Paving Cement

DES MOINES, IOWA, Aug. 3—Direct purchase of cement from the mills for primary road building under state highway commission contract, adopted this week for the first time by the commission, will save the state about $400 a mile in construction cost, Clifford L. Niles, chairman, estimated.

Contracts have been made with cement companies of this city to furnish 40,000 barrels of cement for each of two nine-mile paving contracts in Boone and Audubon counties. The state bought the cement at a saving of 10 cents a barrel, each lot costing about $75,000. Dealers figuring in cement on the job based estimates on a 10 per cent cash discount and a dealer differential of about the same amount.

Gillette Is Enlarging Plant

EAU CLAIRE, WIS., Aug. 5—The Gillette Rubber Co. is pushing work on the erection of a number of factory extensions which will cost about $150,000. A new shipping room is being provided by building a two-story extension, 87 x 240 ft., with a third-story, 160 x 240 ft., covering part of an existing structure, under direction of Ralph W. Hutchens, vice-president and factory manager.

Truck Sales Up 50 Per Cent

CHICAGO, Aug. 6—Record-breaking sales, which set a new mark for the first six months of 1929, are reported by C. A. Tilt, president of the Diamond T Motor Car Co. Truck sales for the first half of the year were 55 per cent greater than for the first six months in 1928, and more than 100 per cent greater than the twelve months total for 1927, which was the greatest year in the history of the company.

British Industry is Seeking Color Unity

WASHINGTON, Aug. 8—British motor body builders have joined with dress goods manufacturers, boot and shoe manufacturers, and dyers' associations in the establishment of a permanent "Color Council" whose function it will be to determine, coordinate and propagate color tendencies, according to a report received this week from London by the United States Department of Commerce.

City Officials to Study Airport Design Problems

WASHINGTON, Aug. 8—City officials throughout the country are preparing to lay their airport problems before a municipal airport conference to be held here Oct. 24-25 by the city officials division of the American Road Builders' Association.

An immediate response to the announcements of the conference sent out ten days ago to several thousand officials of city governments indicates the widespread desire to learn more about airport development. Atlanta, Ga., was first to indicate that it would be represented.

Many of the country's outstanding airport engineers and builders will meet with the civic representatives to develop specific knowledge of the present practices and future requirements of airport construction. Such knowledge is of vital importance to every city, it is held.

Eagle Aircraft to Take Wallace to Kansas City

DETROIT, Aug. 6—The American Aircraft Corp., Kansas City, has purchased the Wallace Aircraft Co., Chicago, E. E. Porterfield, Jr., American Eagle president, announced today.

The factory of the Wallace company will be moved to Kansas City, and operated as a unit of the newly formed American Eagle subsidiary, Porterfield Aviation Interests, Inc. The purchase was said to involve $250,000.

Stanley Wallace, designer and general manager, will remain as chief engineer of the Wallace company.

Australian Sales Are Down

WASHINGTON, Aug. 6—Automotive sales in Australia for the first six-month period of this year will fall below those for the corresponding period of last year, it is predicted in a report received this week by the Department of Commerce from Sydney. The report states, however, that the proportion of American cars and trucks will probably show an increase. The motor trade is reported as being seasonably dull with the demand for light passenger cars and trucks showing some improvement.

Cadillac Completes Building

DETROIT, Aug. 5—Cadillac's new engineering building, a part of its $5,000,000 expansion program inaugurated last spring, was officially opened following an inspection of its facilities by the General Motors Corporation executive committee Aug. 3.

The building and equipment already installed cost more than $1,000,000, and $250,000 has been appropriated for additional equipment over the next three years. It is almost a complete motor car factory within itself.

Calendar of Coming Events

SHOWS

Automotive Exhibit, Canadian National Exhibition, Toronto ....Aug. 23-Sept. 7
Vienna Fair .....Sept. 1-8
International Aircraft Exhibit, Coliseum, Chicago .....Sept. 7-15
National Machine Tool Builders' Exposition and Congress, Cleveland, Sept. 30-Oct. 4
Paris, Automobiles .....Oct. 3-13
London, Automobiles .....Oct. 17-26
Prague, Automobiles .....Oct. 23-30
Paris, Motorcycles .....Oct. 23-Nov. 3
M.&E.A. Show and Convention, Chicago .....Nov. 4-9
N.S.P.A. Show and Convention, Detroit .....Nov. 11-16
Berlin Auto Salon .....Nov. 14
London, Trucks .....Nov. 7-16
Paris, Trucks .....Nov. 14-24
London, Motorcycles .....Nov. 30-Dec. 7
Brussels Auto Salon.....Dec. 7
New York National.....Jan. 4-11
Chicago National, Coliseum..Jan 25-Feb. 1

CONVENTIONS

Second Pan-American Congress of Highways, Rio de Janeiro.....Aug. 16-31
American Welding Society, Fall Meeting and Exposition, Cleveland....Sept. 9-12
American Institute of Mining and Metallurgical Engineers, Cleveland, Sept. 9-12
American Society for Steel Treating, Convention and Exposition, Cleveland .....Sept. 9-13
American Chemical Society, Fall Meeting, Minneapolis .....Sept. 9-13
A.S.M.E.—Iron and Steel Division—National Meeting, Cleveland....Sept. 9-13
Society for Electrical Development, New York City .....Sept. 13
Eastern States Exposition, Springfield, Mass. .....Sept. 15-21
American Electric Railway Association, Atlantic City .....Sept. 28-Oct. 4
National Industrial Advertisers Assn., Cincinnati .....Sept. 30-Oct. 2
National Safety Congress, Annual, Chicago .....Sept. 30-Oct. 4
Penna. Automotive Association, Erie, Pa. .....Oct. 7-8
Permanent International Association of Road Congresses, Sixth Session, Washington, D. C.....Oct. 7-11
Society of Industrial Engineers, Detroit .....Oct. 16-18
National Hardware Association, Atlantic City .....Oct. 21-24
Society of Industrial Engineers, Sixteenth Annual Meeting, Hotel Statler, Cleveland .....Oct. 23-25
Amer. Gear Mfrs. Asso., Phila...Oct. 24-26
World Engineering Congress, Tokio, Japan .....Oct. 29-Nov. 22
National Automotive Parts Association, Detroit .....Nov. 6-8
Highway Research Board, Ninth Annual Meeting, Washington, D. C. Dec. 12-13
National Automobile Dealers Association, New York City .....Jan. 6
American Roadbuilders Association, Atlantic City .....Jan. 11-18
National Automotive Dealers Association, Chicago .....Jan. 27-28

RACES

British Tourist Trophy Race.....Aug. 17
Cleveland .....Aug. 18
National Air Races and Show, Cleveland, Aug. 24-Sept. 2
European Grand Prix, Italy.....Aug. 31
Altoona, Pa. .....Sept. 2
Schneider Trophy (Aeronautical), Calshot, England .....Sept. 7
Syracuse .....Sept. 8
Toledo .....Sept. 15
Los Angeles .....Nov. 17

S. A. E.

Aeronautic Meeting, Cleveland..Aug. 26-28
Production Meeting, Cleveland.....Oct. 2-4
Transportation Meeting, Toronto.Nov. 12-15
Annual Meeting, Detroit.....Jan. 21-24

SALONS

Hotel Drake, Chicago .....Nov. 9-16
Hotel Commodore, New York City.Dec. 1-7
Hotel Biltmore, Los Angeles.....Feb. 8-15
Palace Hotel, San Francisco, Feb. 22-Mar. 1